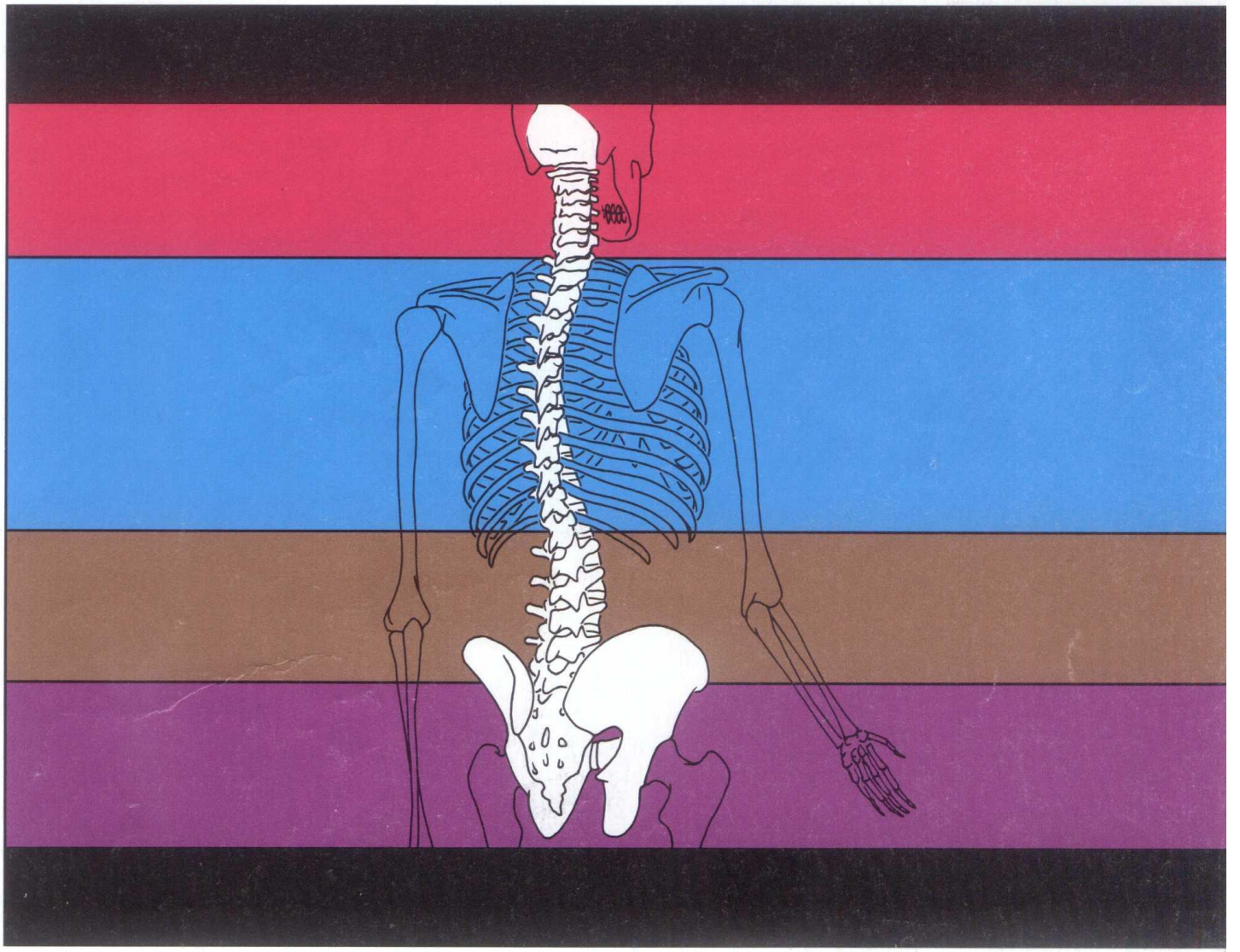
Gonstead Chiropractic Science & Art

The Chiropractic Methodology of Clarence S. Gonstead, D.C.

by Roger W. Herbst, D.C.



SCI-CHI PUBLICATIONS

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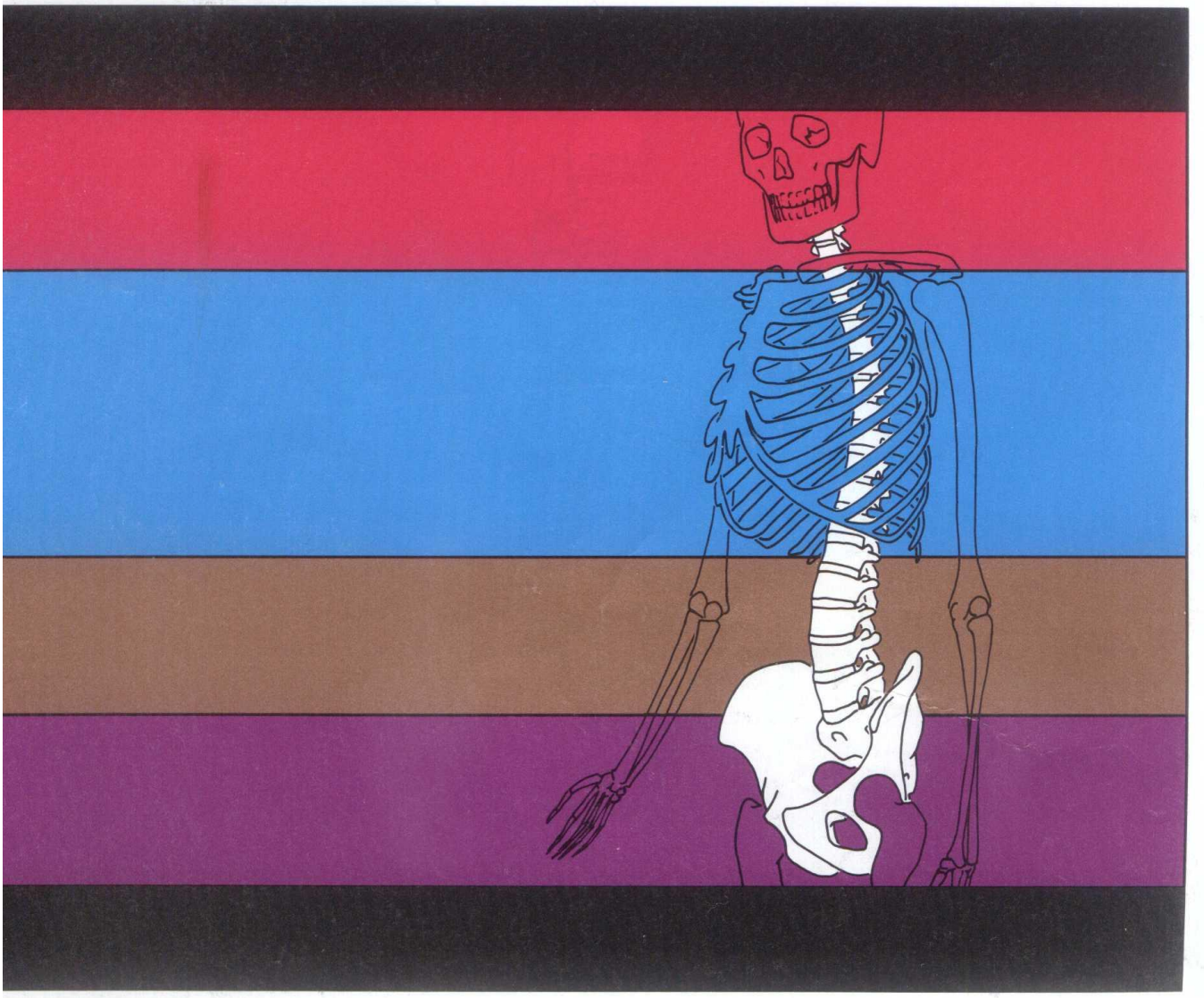
"SCIENCE IS KNOWLEDGE REDUCED TO LAW
AND EMBODIED IN A SYSTEM.
ART RELATES TO SOMETHING TO BE DONE.
SCIENCE TEACHES US TO KNOW, AND ART TO DO."

D. D. PALMER



The contents contained herein are completely authenticated
by their originator, Clarence S. Gonstead, D.C.

Preface

As interest in Dr. C. S. Gonstead's chiropractic methodology mounts throughout world-wide chiropractic circles, so does the need increase for having the work published. To therefore meet this need of field practitioners and students to learn more about the methods researched, developed, and employed by Dr. Gonstead for nearly half a century, this publication is being written.

It is also being written with the belief that we can best safeguard the future of our profession by adopting a scientifically sound methodology which can be duplicated by all chiropractors, on all sick persons with subluxations.

This kind of consistency should be found throughout the profession, just as it is found with other scientific services. The day must soon come that the chiropractor can confidently assure the correction of the subluxation, just as the dentist mends a decayed tooth, and the optometrist prescribes for presbyopia.

That the Gonstead system is such a methodology is best illustrated by realizing that all chiropractors proficient in the Gonstead method would find the *same* subluxations as the cause of nerve interference in any particular patient. These would then be corrected in like manner, and the patient would respond in the same express time, regardless of which Gonstead-trained doctor administered the chiropractic care.

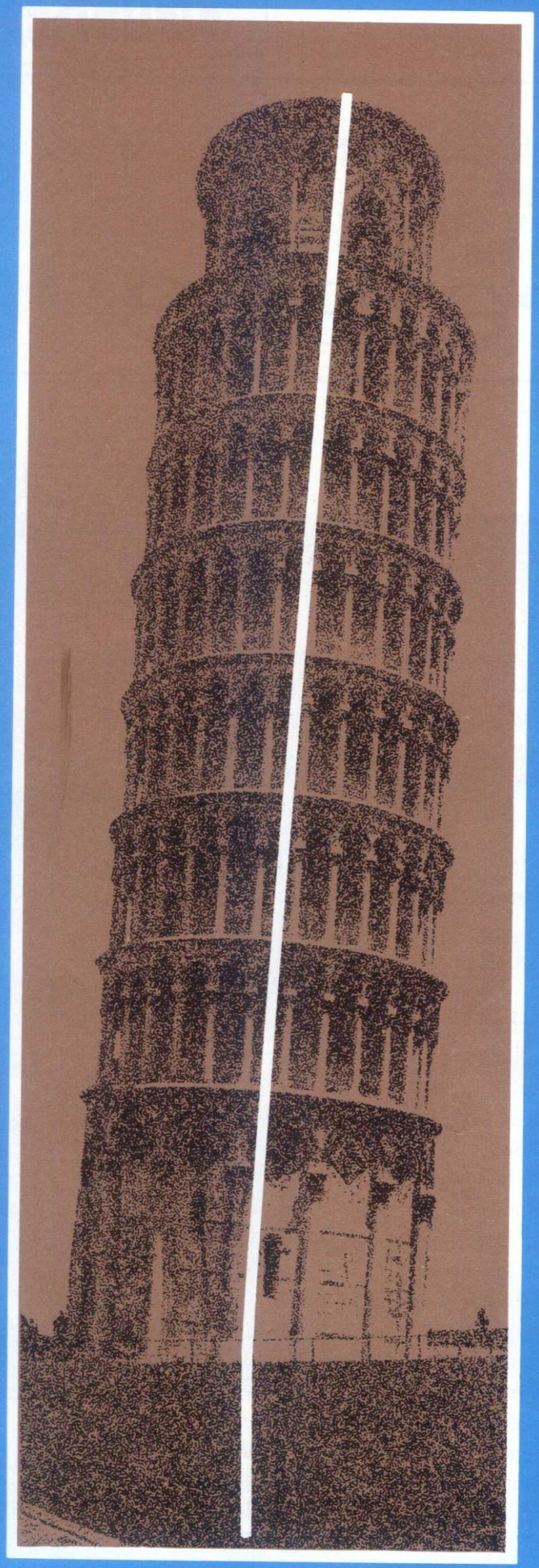
A logical criterion for determining the efficacy of a chiropractic methodology is by the speed in which the patient responds with a physiological change toward normal. This is a measure of how directly the method gets to the problem, and corrects it.

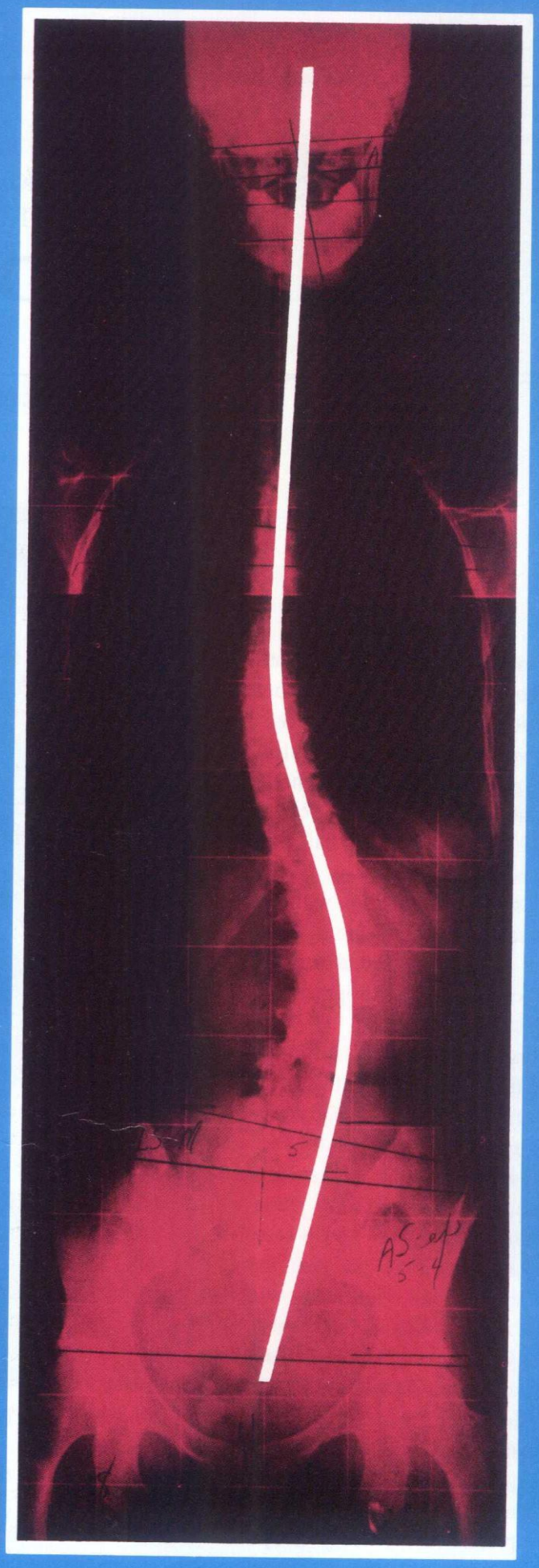
Dr. Gonstead has shown, through correlated evidence from adjustments given his patients, and from blood and urine analysis findings, that when the subluxation is corrected, the physiological response is immediate. He has found that the faster the specific subluxations are found, corrected, and the correction maintained, the shorter the route to health. If favorable changes do not immediately follow the adjustments, then the doctor hasn't chosen the most direct route.

The Gonstead methodology is not a simple method of drawing lines on an x-ray film, adjusting the prescribed areas, and expecting results to follow. The specialty we practice is much more abstruse than that would allow.

Instead, it is a system of meticulously analyzing the patient, and on the basis of all the information acquired, deciding what corrective steps to take. It is a system that can be learned by all who diligently apply themselves, and who aspire to duplicate the results obtained at the Gonstead Clinic. It is for those chiropractors willing to persevere, realizing that the knowledge gained will enable them to best serve the patient.

Its scientific exactness, its untraumatic effect on the patient, and its predictability of prompt results, all help the Gonstead practitioner build a solid referral practice. It proves that what *is* best for the patient, is also best for the chiropractor.





Introduction

The Level Foundation

Every engineer knows the importance of the foundation when building a structure. A good foundation insures durability and long life. Any slight change or shift in the foundation can cause a great amount of deviation above.

The same holds true with the human structure, and it is upon this principle that Dr. Gonstead developed his technique. The body's foundation, formed by the pelvic girdle, must be considered from an engineering point of view. When it is level, within the anatomical limitations of the individual, there will be maximum balance and stability in the spinal column. This will allow the forces of gravity to work toward maintaining the chiropractic adjustment, instead of working against it.

It is not to be implied that the chiropractor's objective is to straighten the spine. Since every individual has some structural variations, each spine will vary according to those differences. "What is normal for one may not be normal for another."

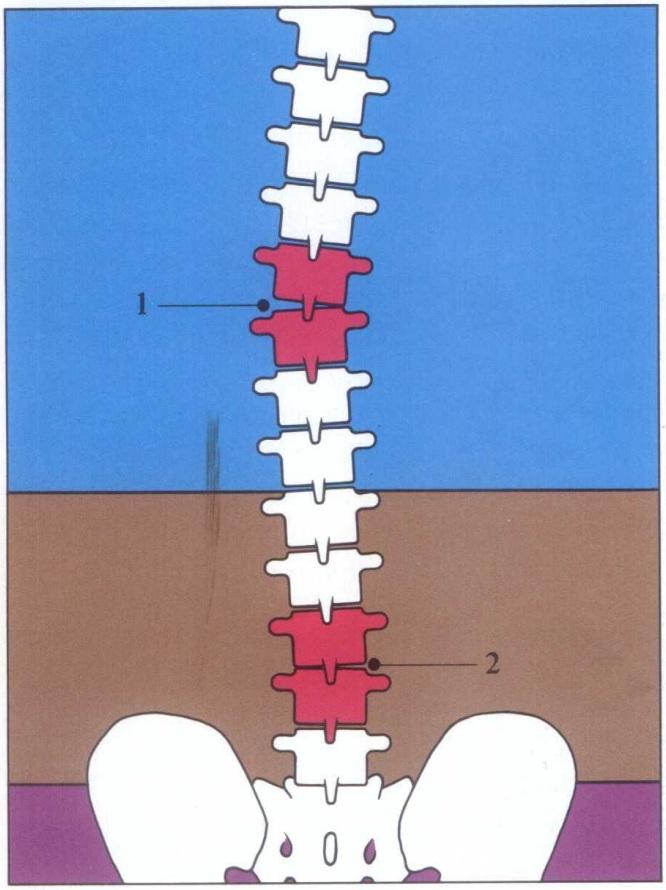
The Intervertebral Disc

The entire basis for the Gonstead methodology evolves around the intervertebral disc. The doctor must fully understand the role the disc plays in the vertebral subluxation. It is the analysis of the disc, and the changes it undergoes, that gives the most reliable information for locating the potential* subluxation. Since the disc itself cannot be seen on the x-ray film, the state of the disc must be inferred from the condition of the *disc space*. Critical analysis

**We use the qualifying term* potential *because in chiropractic terminology the word subluxation, when used alone, always implies nerve involvement. Whether nerve interference exists at any given time must be determined by means other than through the analysis of the disc.*

Clarence S. Gonstead, D.C.

of the degenerative conditions of the discs and of misalignments of the vertebral bodies are not in themselves sufficient evidence for locating a potential subluxation. Dr. Gonstead has found that the most severely misaligned vertebrae are often compensatory misalignments to actual subluxations elsewhere.



Compensation

A considerable number of misalignments within the spine are compensations instead of subluxations. A compensation[1] is a vertebral misalignment that results from a subluxation[2] elsewhere. It is an effect, and every subluxation causes one. It is similar in concept to the law, "every action has an opposite and equal reaction." But a compensation is usually not equal to a subluxation, at least in its appearance on the film. They are usually much more obvious in their degree of misalignment.

If one does not understand compensation within the spine, he will inadvertently be *adjusting* the gross misalignments, i.e., the compensations. The subluxations will remain uncorrected, and the patient will not respond. This may be the most important reason why many chiropractors help only a small percentage of their patients.

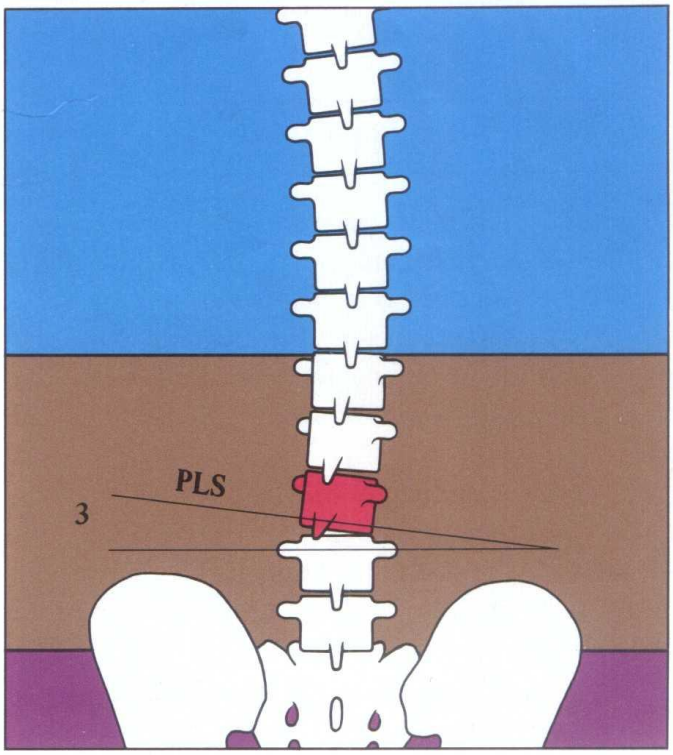
Fixation

Every subluxation is, at the same time, a fixation. That is, the subluxated vertebra is fixed, or immobilized, in relation to another vertebra or anatomical part until it is adjusted. Those misaligned vertebrae that change position readily, as when the patient moves about, are in a compensatory position, and do *not* need to be adjusted. It is the cause of the compensation that must be discovered and corrected.

Listings

Every subluxation constitutes a structural derangement between two anatomical parts that would be in direct apposition under normal conditions. That is, one part has become misaligned with another.

When the misaligned part exists as a potential subluxation, as opposed to a compensation, it is listed in the doctor's records and on the patient's x-ray film. The term *listing*[3] has come to mean the group of letters that represents the direction of travel of a misaligned part. Thus, one's listing of his atlas might be *ASRP*, or of his fifth lumbar, *PLS*. Part of the listing may also represent the point of contact on the vertebra where the thrust is delivered when an adjustment is made. For example, the "M", of a *PLS-M* listing, indicates the mammillary process as the contact point.



The letters used in Gonstead analysis, and the words they abbreviate, are given below:

A	– anterior	I	– inferior
P	– posterior	S	– superior
IN	– internal	T	– transverse
EX	– external	LA	– lamina
R	– right	M	– mammillary
L	– left	SP	– spinous

Film Identification

The x-ray film is always observed and analyzed as the patient would appear to the doctor from behind. That is, when the x-ray is placed in the illuminator, the right side of the patient is always on the doctor's right.

A standardized procedure that would virtually eliminate the error of marking the film on the wrong side would be to always put the x-ray marker to the patient's upper right-hand side. In this way, the marker would not only show whose film it is, but also immediately orient the doctor to the right-hand side of the patient.

When the film is being observed in the illuminator, the doctor can be assured that the film is correctly placed if the marker is in the upper righthand corner. Such a standardized practice would also make identification of the film much easier when films change hands.

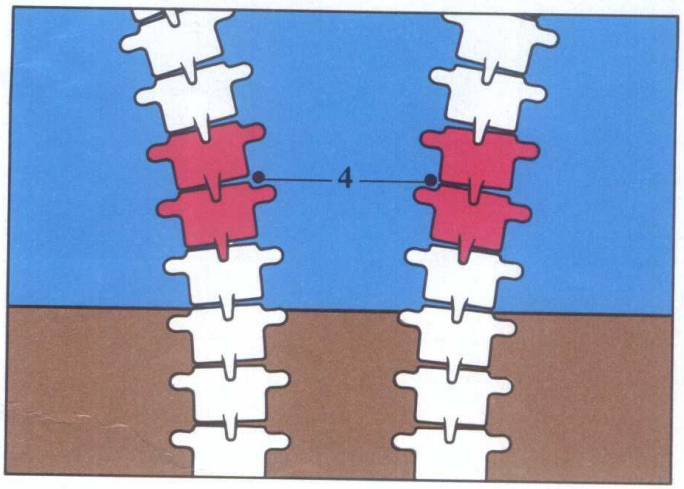
Film Requirements

It would be logical to begin this publication with a chapter on the procedure for taking x-rays. However, because Dr. Gonstead is in the process of developing new and advanced x-ray equipment, especially adapted to his work, and to be used exclusively by chiropractors, this area of study will be presented later.

Just a few basic points will be given at this time, relative to patient positioning for the A-P view. This is to enable the doctor to begin taking films of the pelvis that he can analyze using the Gonstead methodology.

1. The patient is positioned in the center of, and in front of, the bucky table.
2. The patient then takes small steps backwards until the first part of him touches the bucky table. He should be standing comfortably, and should not be pressing hard into the bucky table. Doing so decreases the value of the film for accurate pelvic analysis.
3. The patient's heels should be on a line parallel to the film.
4. The heels are spread apart about four inches.

It should be mentioned that accurate and proper positioning is important in order to obtain an authentic x-ray of the patient's spine. This does not mean that some slight variation in position will change the patient's spinal architecture and nullify the film; because, as was mentioned previously, a subluxation implies a fixation,[4] and the relationship between the fixed parts does not change as the patient moves about. It merely means that the greatest amount of information can be taken from the film when the suggested procedures are followed.



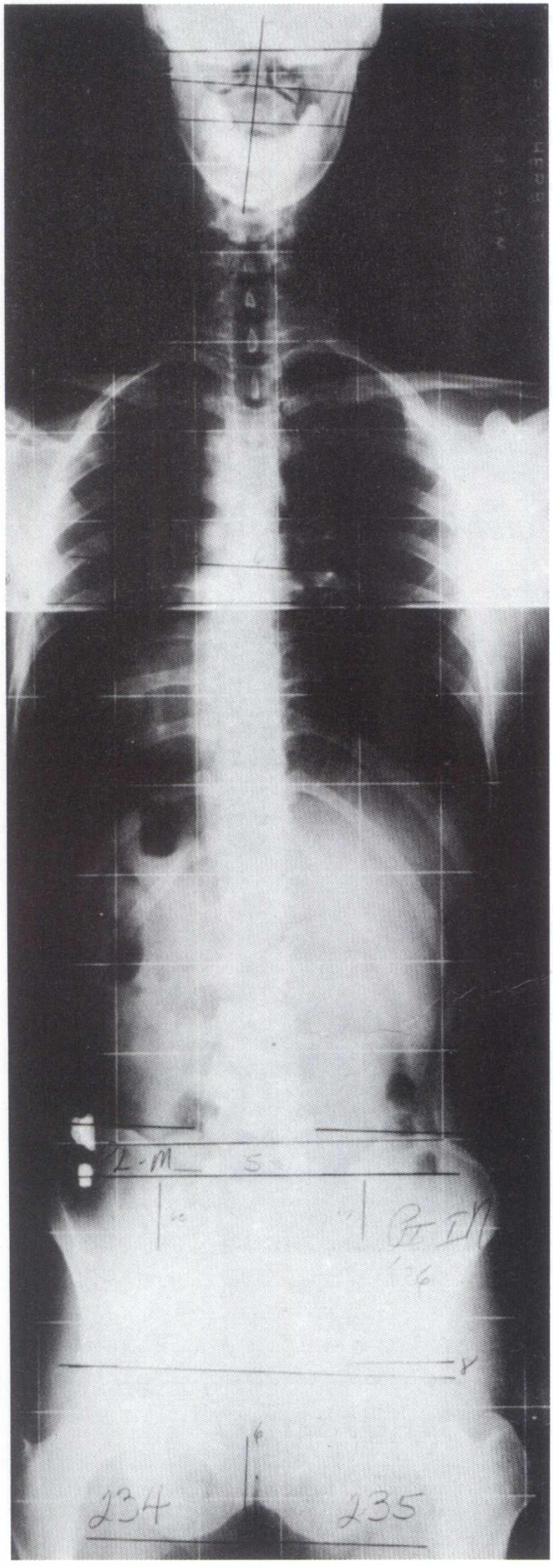
Standard Views Taken

The Gonstead system of analysis always includes two 14 x 36 full-spine films, of the A-P and lateral views. There may be times when smaller than 14 x 36 films are indicated, such as a "spot-shot" of a specific area. However, in order to insure continuity of the entire spine, the 14 x 36 film is required.

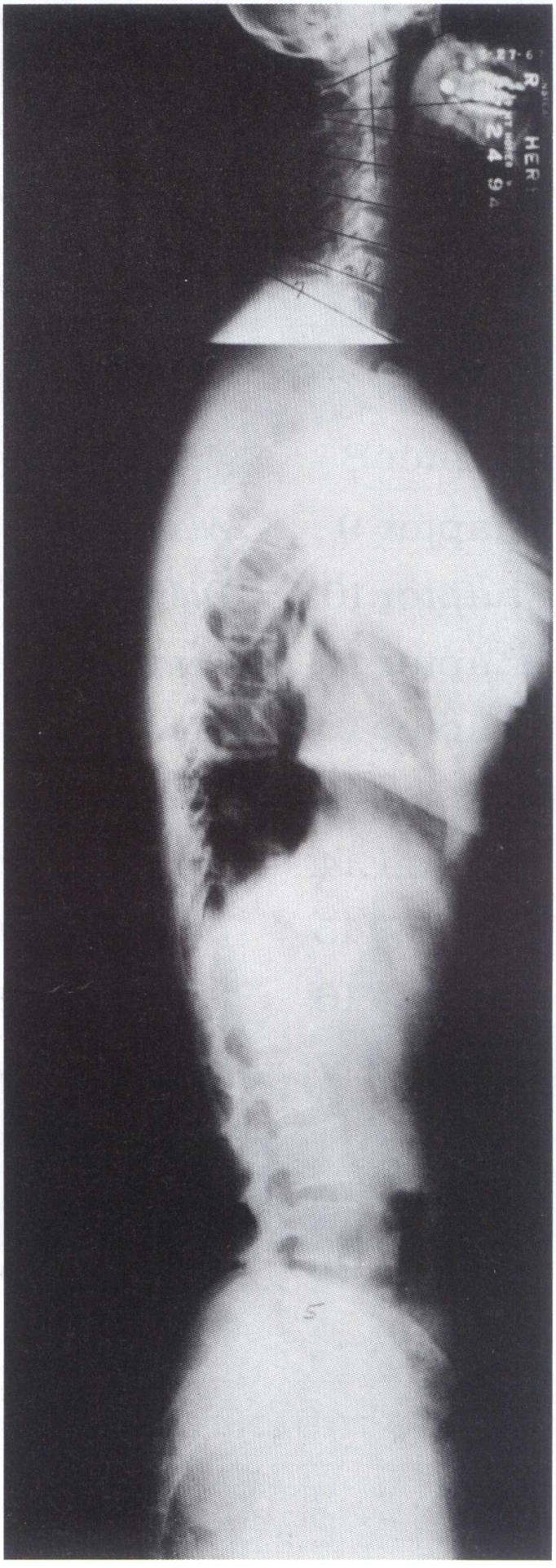
When only portions of the spine are shown in this text, it is for space-saving reasons only. It should not be construed that smaller than 14 x 36 films are sufficient for this work.

The Standard 14 x 36 Inch Views

A-P View

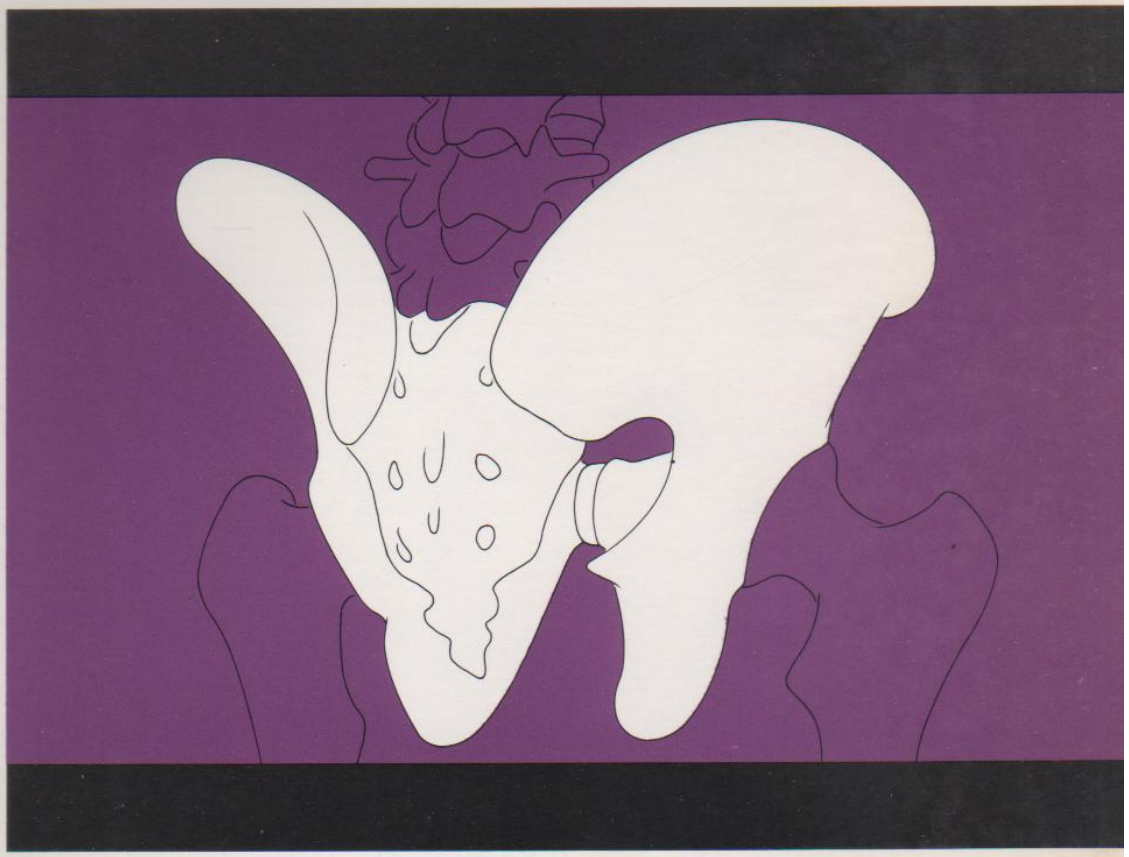


Lateral View



The A-P Ilium Misalignment

Chapter I



Gonstead Chiropractic Science & Art

Chapter I

The A-P Ilium Misalignment

Directions of Ilium Misalignment

The basic directions that the ilium can become misaligned with the sacrum are anteriorward, posteriorward, medialward and lateralward. This chapter relates the changes that occur in the pelvis when the ilium becomes misaligned in the anterior and posterior directions.

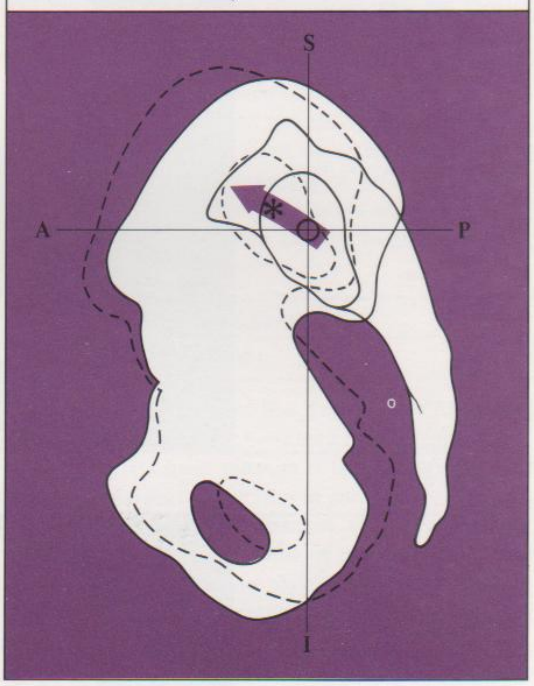
Where the Misalignment Occurs

We say that the *ilium* becomes misaligned, instead of the innominate, to emphasize that the ilium is the portion of the innominate that articulates with the sacrum, and it is at this articulation that the misalignment actually occurs. This point bears repeating since there is a tendency to think the subluxation occurs at the coxal articulation (hip-joint): *When the ilium becomes misaligned, it does so in relation to the sacrum, and the actual misalignment occurs in the sacroiliac articulation.*

The AS Ilium

As an ilium misaligns anteriorward on the sacrum, it also goes in a superior direction. This is due to the nature of the auricular surfaces of the joint, and because of the angle of the pelvis itself. The ilium travels in an arc, in an anterior and superior direction, away from its normal relationship with the sacrum. The designation of such a misalignment is an *AS Ilium* (Fig. 1).

Figure 1: *Direction of A-S Ilium Misalignment.*



Mechanics of the AS Ilium

To clearly demonstrate the mechanics of the AS ilium, illustrations are shown of both the normal (non-misaligned), and the AS ilium misalignment, in the A-P and lateral aspects (Figs. 2–5).

In the normal A-P illustration (Fig. 2), a horizontal line is drawn through the sacroiliac articulation at the level of the posterior superior spine (PSS) of the

ilium, and the second sacral tubercle. These anatomical landmarks are placed on the same level for convenience of illustration, and may or may not actually be so apposed in any given patient. A vertical line is drawn through the approximate center of the sacroiliac joint. The point at which the two lines bisect each other serves as a point of reference for the articulation; an asterisk (*) and a circle (○) are superimposed here in the normal view. The asterisk represents the center of the joint surface on the ilium, and the circle represents the same adjacent point on the sacral joint surface.

In the AS misalignment illustration (Fig. 3), the asterisk and the circle are no longer superimposed, the asterisk being *superior* to the circle. This implies that the entire joint surface of the ilium has moved superiorward in relation to the joint surface of the sacrum.

Figures 4 and 5 show before and after AS misalignment views, from the lateral aspect. The *anterior* displacement of the ilium joint surface is demonstrated, as well as the superior displacement.

The asterisk appears both superiorward and anteriorward to the circle.

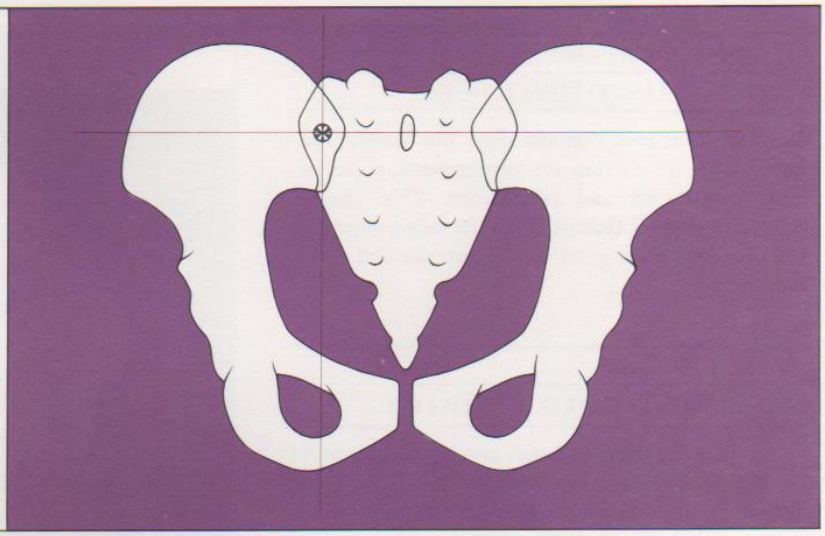


Figure 2: *Normal Ilium, A-P View.*

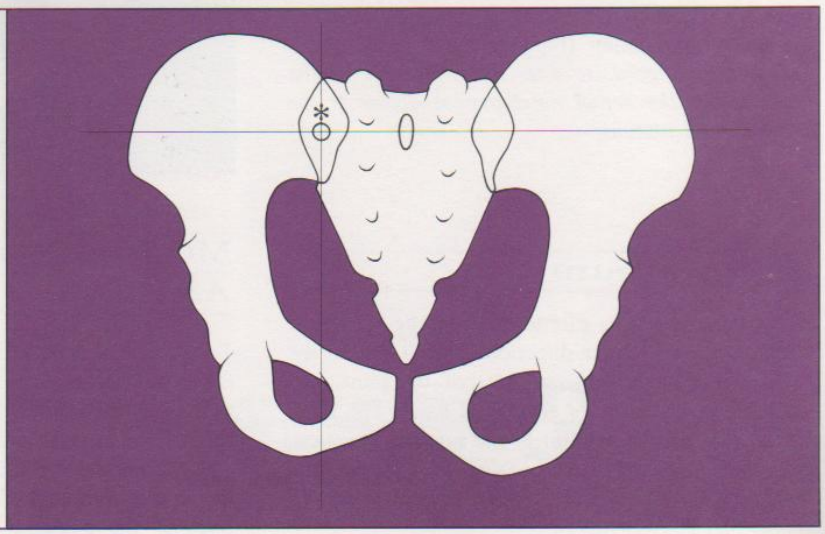


Figure 3: *A-S Ilium, A-P View.*

Figure 4: *Normal Ilium, Lateral View.*

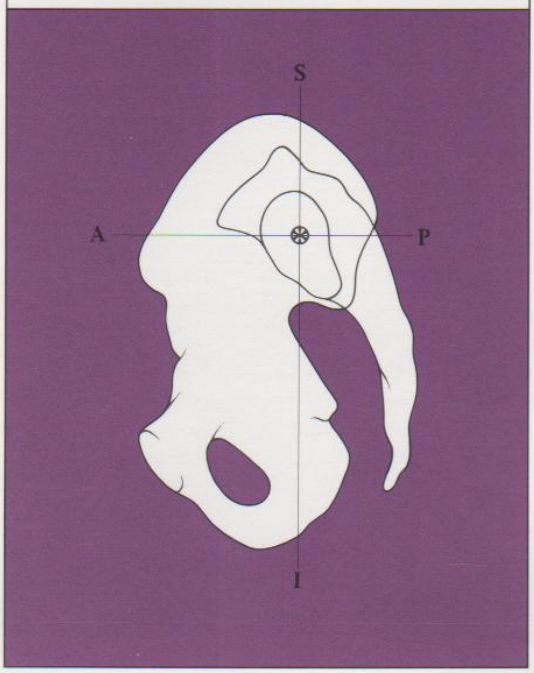
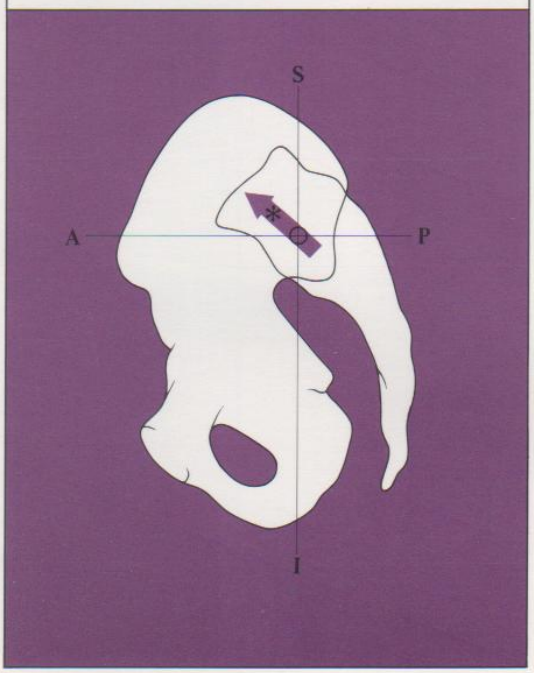


Figure 5: *A-S Ilium, Lateral View.*



Changes Accompanying the AS Ilium

Decrease in Innominate Measurement

The most important change that the AS ilium undergoes is the decrease in the length of the innominate, as seen on the A-P spinograph. The relative lengths of the two innominates are compared, and the shorter one is the AS ilium. Why this occurs is clearly illustrated in figures 6 and 7. As seen from the lateral aspect, *the superior-to-inferior dimension decreases as the ilium moves in an AS direction*. This change cannot be easily measured from the lateral x-ray, due to the superimposed innominates of both sides. However, the change is readily measured on the A-P x-ray view when the proper film analysis technique is used.

Measuring the Innominates

The instrument used for line drawing and measuring on the x-ray film is the Gonstead Radiographic Parallel (Fig. 8). Its main purpose is to transfer a parallel line from one part of the film to another.

The innominate measurements are determined by first establishing the base line of the spine, called the *femur head line*. This line serves as the base for measuring the respective lengths of the two innominates.

Procedure

1. Place dots at the tops of the femur heads, the tops of the iliac crests, and at the most inferior border of the ischia (Fig. 9). (If the tips of the ischia are not included on the film, the measurements will be invalid. An attempt to use another part of the ischium will prove to be futile. Ischium inclusion on the film is a prime consideration when placing the patient.)
2. The leading edge of the parallel is placed on the dots over the femur heads, and a line is drawn. This is the femur head line (Fig. 10).

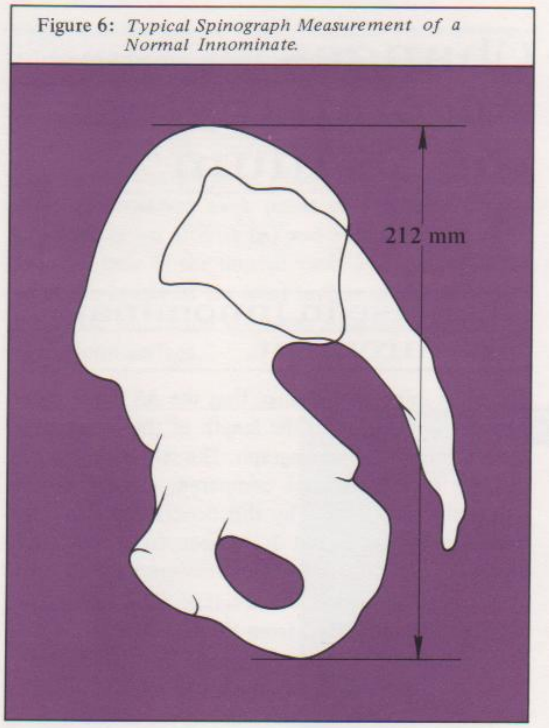


Figure 6: *Typical Spinograph Measurement of a Normal Innominate.*

3. With the parallel on the femur head line, it is moved up to the dots on the iliac crests, stopping at the lower of the two first. A line is drawn from the lumbar body, lateralward.
4. The parallel is then moved to the dot of the higher crest, and a line is drawn. Remember that these two crest lines must be parallel to the femur head line. They are drawn separately, and do not join each other.
5. The parallel is then inverted, and the leading edge is again aligned with the femur head line. Lines are then drawn through the dots on the ischia, each one drawn independently. Figure 11 shows a film with the lines drawn.
6. Measure the distance between the crest and ischium lines of each innominate, and record the measurement on the film in the appropriate place (Fig. 12). These are designated as the *Innominate Measurements*. The millimeter scale on the leading edge of the parallel is used for taking the measurement.

The smaller of these two measurements represents the AS ilium. The larger measurement represents the *PI Ilium* (see page 8).

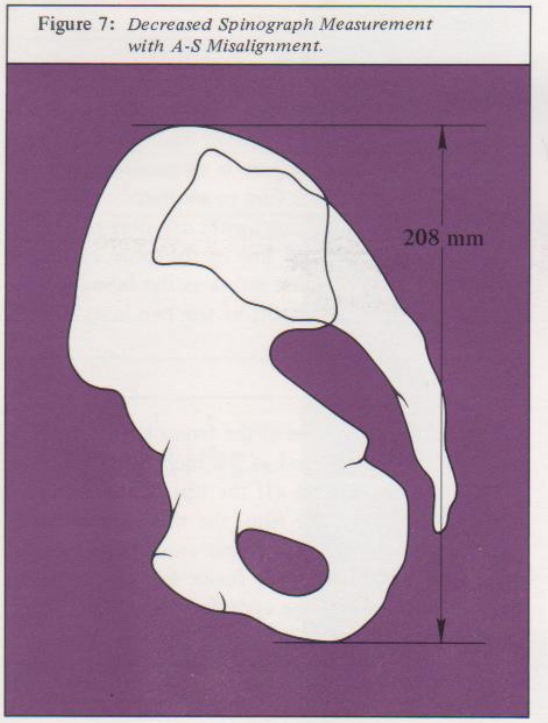


Figure 7: *Decreased Spinograph Measurement with A-S Misalignment.*

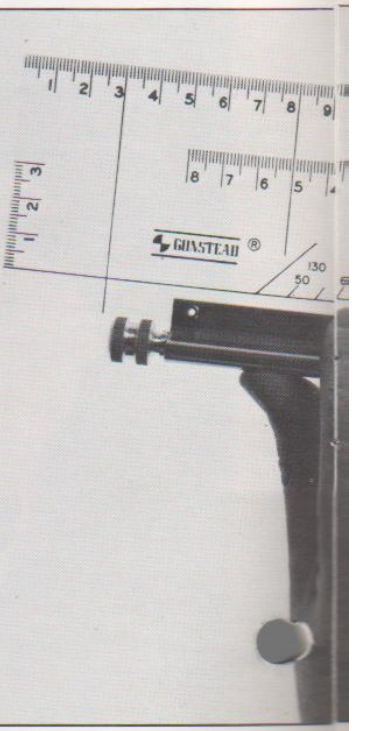
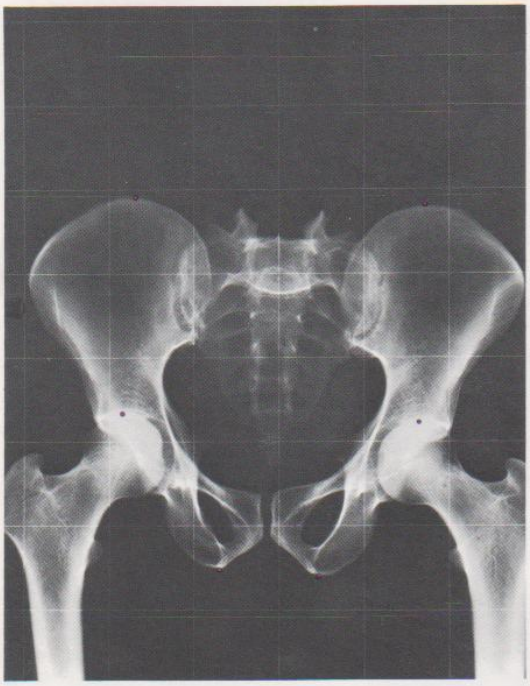


Figure 8: *The Gonstead Radiographic Parallel.*

Figure 9: *Film with the Dots Placed.*



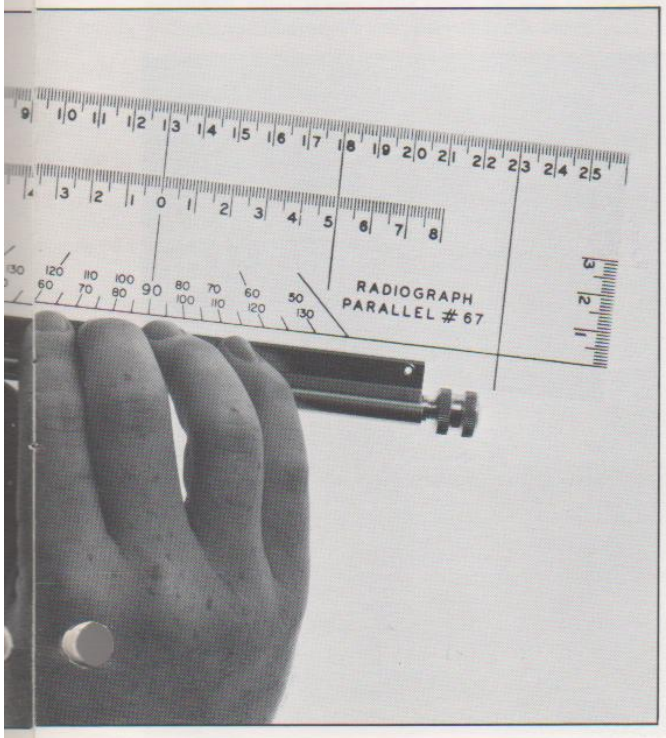


Figure 10: *The Femur Head Line.*

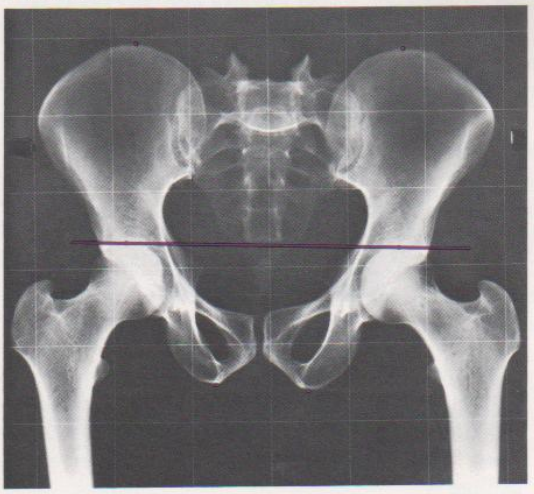


Figure 11: *Film with the Lines Drawn.*

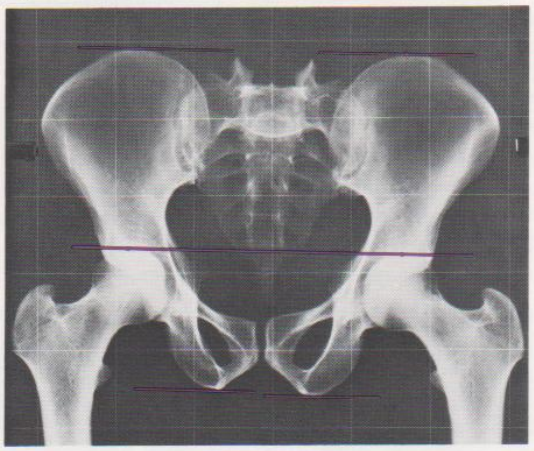
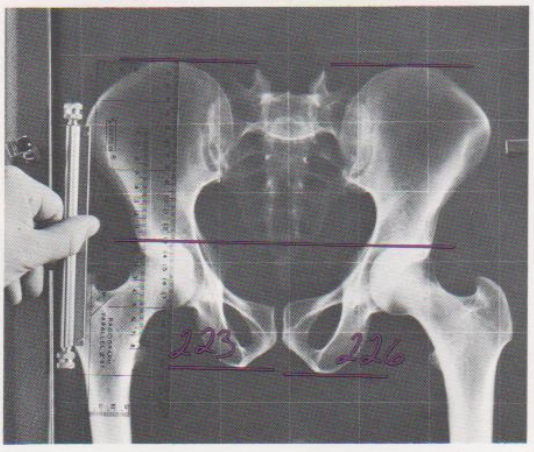


Figure 12: *Measuring and Recording the Innominate Measurements.*



Altered Obturator Shape

Another change that occurs with an AS ilium is the projected shape of the obturator foramen, as seen on the x-ray. The two obturator foramina must be compared. The AS obturator decreases in length diagonally, while that of the opposite side increases in length diagonally. The shape of the obturators will also be influenced by other misalignment factors in the pelvis. These will be discussed later in the text. Notice the difference in obturator shapes in figures 23 and 24.

There may be times when accurate innominate measurements are unobtainable, and reference to the obturator shape will be made in order to aid in the analysis of the patient. Such an instance might be when there is erosion of the iliac crest, or of the ischium.

Loss of Lumbar Curve

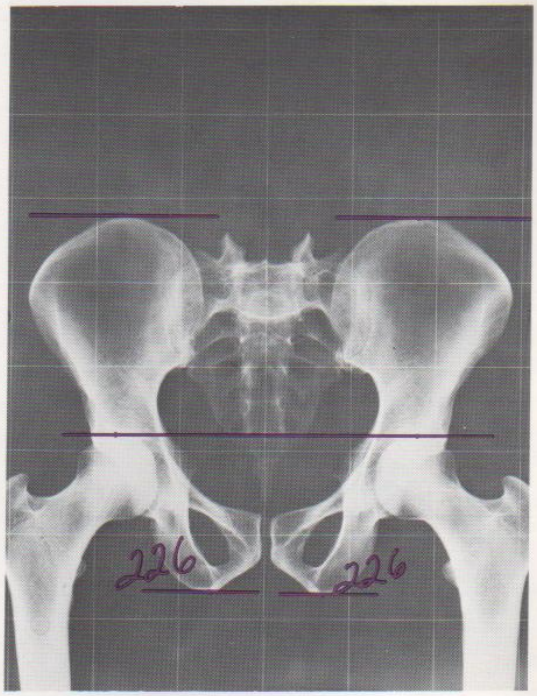
Another change that results from an AS ilium is a reduction of the normal anterior curve in the lumbar spine, sometimes called hypolordosis. The amount of reduction in the anterior curvature is relative to the degree of AS misalignment, and in severe cases is very apparent on the lateral film. Concurrent with the anterior curve reduction in the lumbar spine is a lessening of the normal thoracic posterior curve, and of the normal cervical anterior curve. To repeat, the amount of curvature loss is relative to the degree of misalignment, and in severe cases there is an almost complete loss of spinal curvature in the A-P direction, resulting in a "poker-spine" effect. The AS misalignment is usually only partly responsible for the curvature loss in such a case.

Femur Head Level

Assuming that the lower extremities are anatomically and physiologically normal, a properly aligned pelvis would allow the two femur heads to be equidistant from the floor. A line drawn across the tops of them would be level. This would represent a level base, upon which the rest of the spine would be situated. The level base would augment the balance of the spine, and enhance spinal integrity. (Fig. 13)

A misalignment in the pelvis would change the normal relationship of the femur heads to each other. Such a change may or may not alter the heights of the femurs. This would be determined by the type and degree of misalignment.

Figure 13: *(A) The Level Base.*



(B) The Level Base in a Patient's Film.

AS Ilium Affects Femur Head Level

An AS ilium will raise the femur head of the innominate involved. When the AS ilium is corrected, the femur head height on the involved side will be lowered. IMPORTANT: *Do not construe this to mean that the AS ilium will always be on the side of the high femur head. It is just as likely to be found on the low femur head side.* This is because other factors, such as other misalignments in the pelvis, physiological abnormalities and anatomical differences in the lower extremities, etc., may alter the femur head height. All of these factors must be analyzed and considered, in order to determine if correcting the pelvis problem will establish a level base. In certain instances when correcting the pelvic misalignment won't level the foundation, and the other problems can't be rectified, a shoe lift may be indicated.

Edematous Joint Space

One of the most reliable signs of an ilium being subluxated, and requiring an adjustment, is fluid in the sacroiliac joint space. This palpable sign gives more indication than any other that there is inflammation and nerve irritation involved. It is a symptom that the cognizant doctor will learn to rely heavily upon to determine when to adjust the ilium. Such reliance must, of course, be contingent upon the doctor's ability to interpret what he is palpating.

In the AS ilium, the joint space opens up at the posterior-inferior margin. This causes a bulging of the fibrocartilagenous disc (or the equivalent of such, formed by the posterior sacroiliac ligament), and upon palpation gives a spongy, fluidic effect.

There is a similar opening of the joint space at the superior aspect on the anterior margin. This too presents an edematous, bulging disc. It cannot be palpated, but nevertheless contributes to the picture of pain and other symptoms. The area of the palpable, edematous disc of the AS ilium is illustrated in figure 14.

AS Ilium— Sacrum Relationship

When an ilium moves anteriorward in relation to the sacrum, it can also be said that the sacrum is posterior in relation to the ilium on that side. The significance of this will be apparent in the study of sacral misalignments, and the relationship between the two bones should be kept clearly in mind.

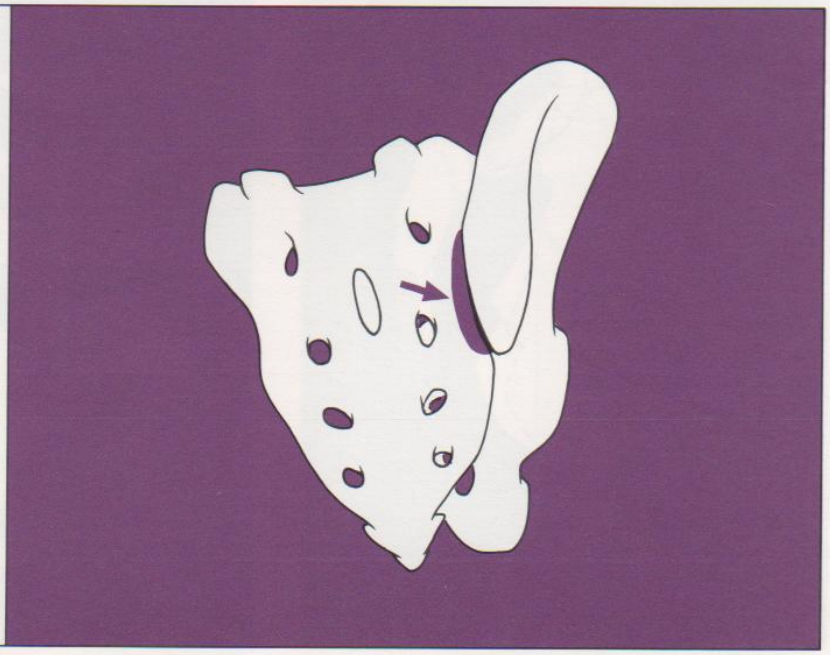


Figure 14: *The Area of the Spongy Disc on an A-S Ilium.*

The PI Ilium

When an ilium misaligns posteriorward on the sacrum, it also moves inferiorward. The ilium travels in an arc, in a posterior and inferior direction, away from its normal relationship with the sacrum. The designation of such a misalignment is a *PI Ilium*. See figure 15 for the direction of PI ilium misalignment.

Mechanics of the PI Ilium

Figures 16 through 19 illustrate the changes that occur with the PI ilium misalignment in the A-P and lateral views. The degree of misalignment is exaggerated to clearly illustrate the change of position.

Changes Accompanying the PI Ilium

Increase in Innominate Measurement

When an ilium misaligns in a PI direction, the length of the innominate involved increases on the A-P film. Why this change takes place is illustrated in figures 20 and 21.

Figure 15: *Direction of P-I Ilium Misalignment.*

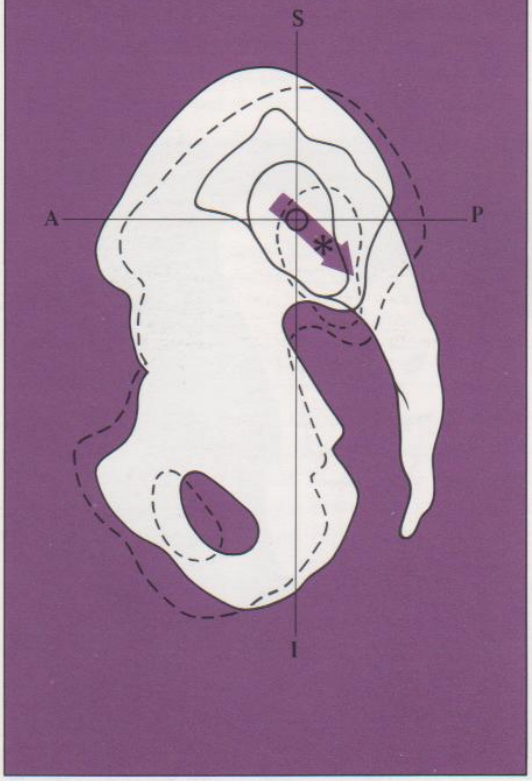


Figure 16: *Normal Ilium, A-P View.*

Figure 17: *P-I Ilium, Lateral View.*

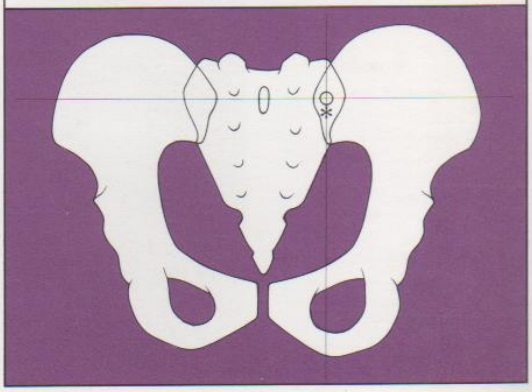


Figure 18: *Normal Ilium, Lateral View.*

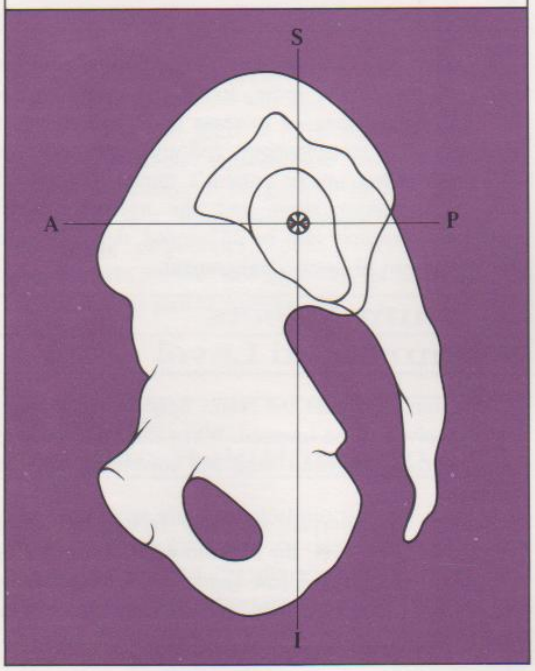


Figure 19: *P-I Ilium, Lateral View.*

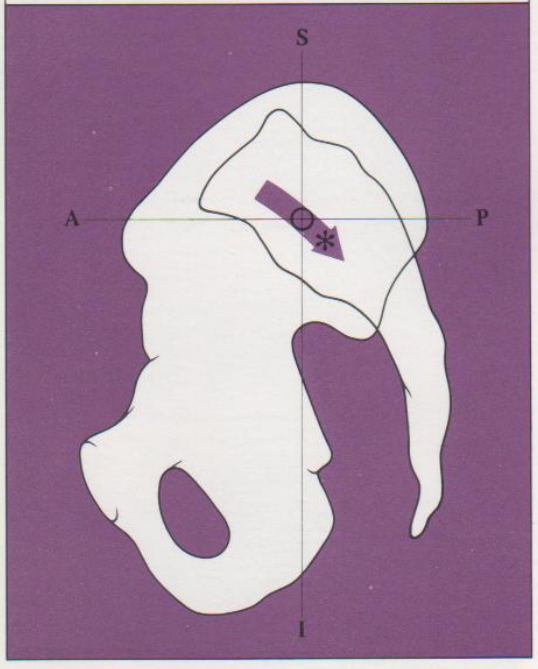


Figure 20: *Typical Spinograph Measurement of a Normal Innominate.*

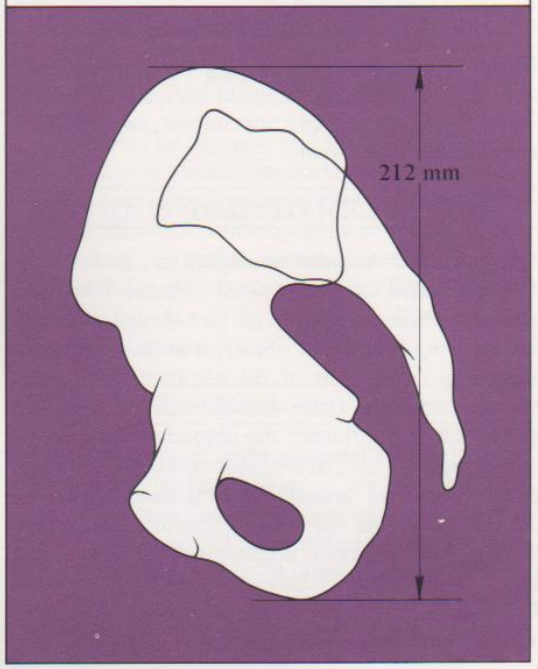
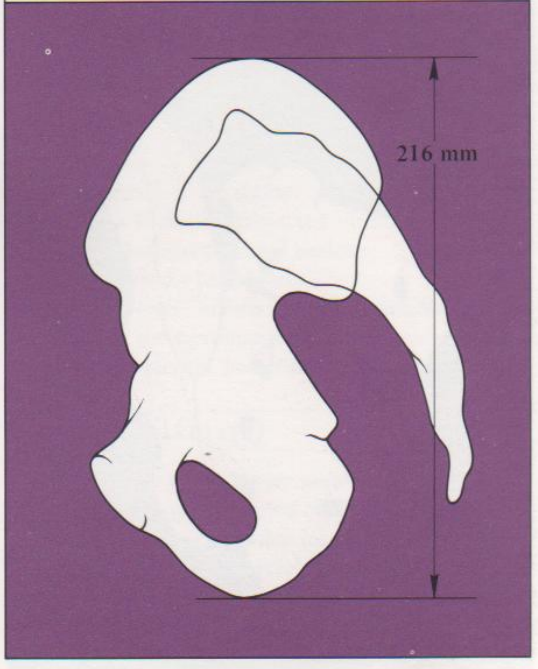


Figure 21: *Increased Spinograph Measurement with P-I Misalignment.*



Measuring the Innominates

Refer to page 3 for the proper film analysis technique for determining the innominate measurements.

The larger of the two innominate measurements accompanies the PI ilium.

Altered Obturator Shape

When the ilium becomes misaligned in a PI direction, the projected shape of the obturator foramen changes. When the sizes of the two obturator foramina are compared, the PI obturator tends to be longer diagonally, while that of the AS ilium tends to be shorter diagonally. Other misalignment factors in the pelvis will also influence the obturator shape. These can change the obturator shapes to the degree where the PI obturator actually projects smaller than the AS obturator, and vice versa. Therefore, one can not rely on the obturator shapes alone when deciding which is the AS or PI ilium. But they do give helpful information when the innominate measurement information is inconclusive.

Figure 22: *The Area of the Spongy Disc on P-I Ilium.*

Increase in Lumbar Curve

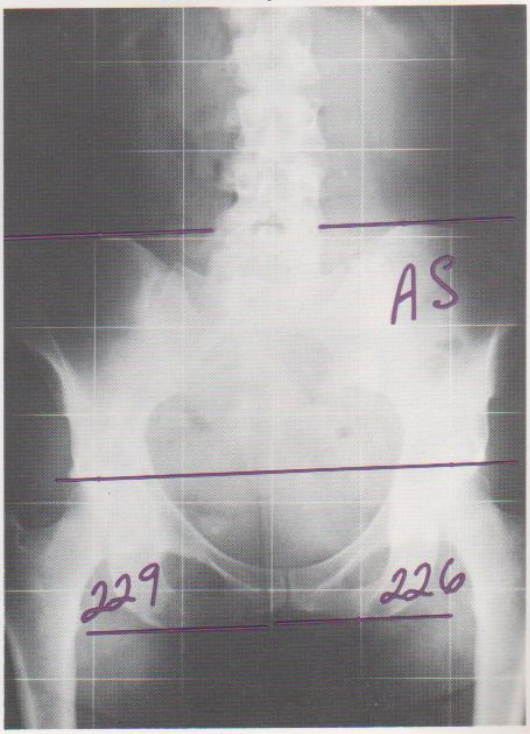
A PI ilium causes an increase in the normal anterior curve of the lumbar spine, sometimes called hyperlordosis. The degree of increase is dependent upon the amount of misalignment, and upon other factors of misalignment in the patient's spine. The normal thoracic posterior curve and the normal cervical anterior curve may also be influenced, depending on the severity of PI ilium misalignment.

PI Ilium Affects Femur Head Level

A PI ilium will cause the femur head of the innominate involved to be lowered. When the misalignment is corrected, the femur head will correspondingly be raised.

Because the interplay of many factors influences the femur head level, the PI ilium will not necessarily be on the side of the low femur head. Determining the PI ilium must be done by the innominate measurement procedure.

Figure 23: *The A-S Ilium, on the Side of Lumbar Body Rotation.*



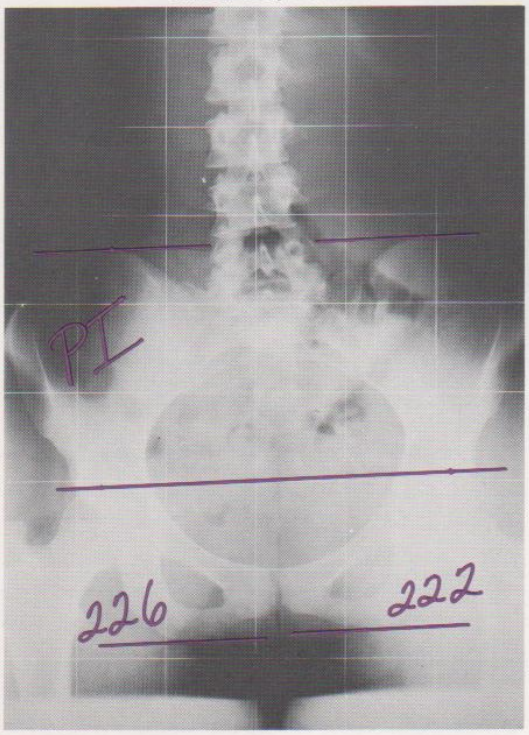
Edematous Joint Space

In the PI ilium, the sacroiliac joint separates in the superior margin of the posterior surface, causing a bulging, edematous area. Identification of this edematous area by palpation will give the doctor positive evidence that the joint is inflamed, and may need adjusting. A similar separation of the joint occurs at the inferior margin of the anterior surface, causing an edematous area there also. Though this cannot be verified by palpation, it does contribute to the symptomatic picture. See figure 22 for illustration of the edematous area of the PI ilium.

PI Ilium— Sacrum Relationship

When an ilium misaligns posteriorward in relation to the sacrum, it may also be said that the sacrum remains anterior to the ilium of the involved side. This relationship is important to consider in the study of sacral misalignments, which will be presented later.

Figure 24: *The P-I Ilium, on the Side of Lumbar Body Rotation.*



Ilium Subluxation-Compensation Relationship

It should now be apparent that when there is a pelvic misalignment in the anterior-posterior direction, there will be a long and a short innominate, as indicated by the two different innominate measurements. Only one of these is a potential subluxation, and is to be considered for an adjustment. The other is a compensation, which will be eliminated when the subluxation is corrected.

Which is Which ?

To determine which is the potential subluxation you need to consider the rotation of the 5th lumbar (or rotation of other lumbars in some instances). How to do this accurately will be considered in a later chapter. As figures 23 and 24 illustrate, however, *the potential subluxation is on the side of the rotated body of the 5th lumbar*, while the compensation is on the side of spinous laterality.

Summary

The AS Ilium

1. is on the side of the shorter innominate;
2. produces a smaller projected obturator foramen;
3. causes a decreased lumbar lordosis;
4. raises the femur head level;
5. causes spongy edema at the posterior-inferior margin of the sacroiliac joint;
6. leaves the sacrum posterior on the involved side.

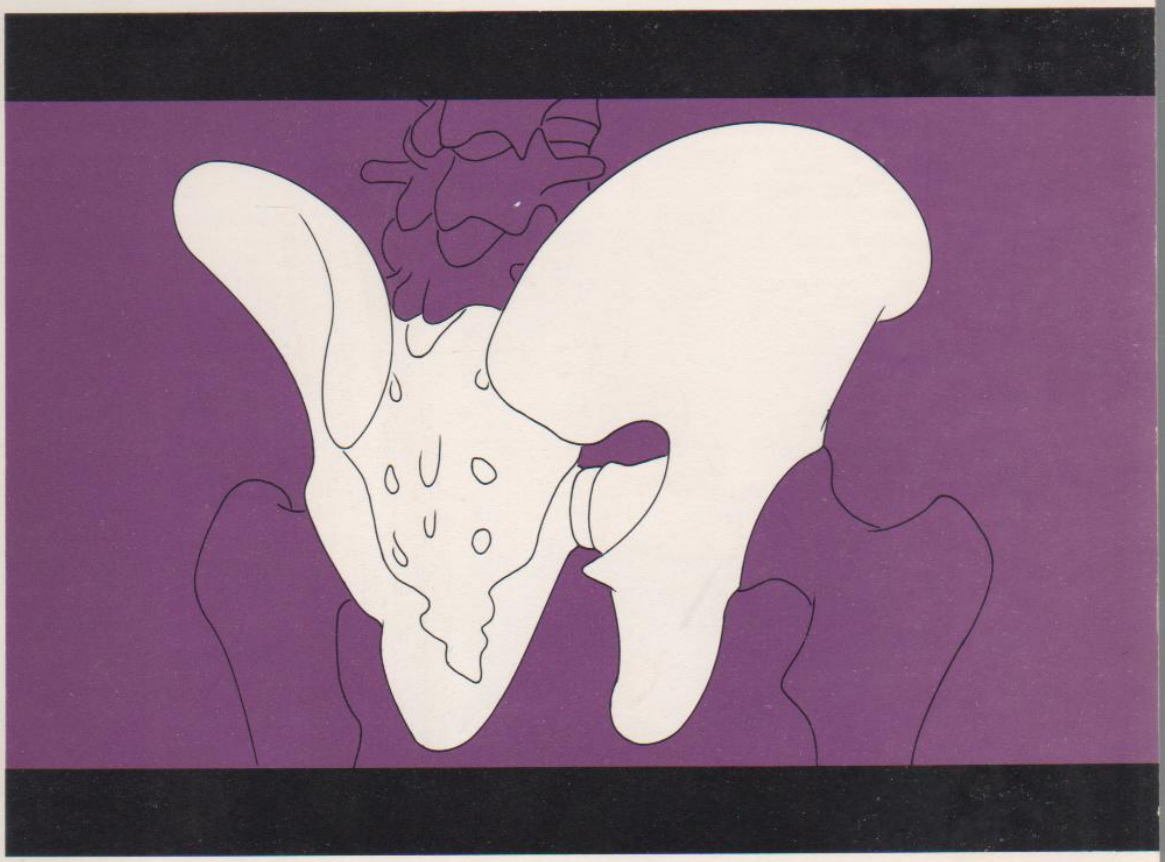
The PI Ilium

1. is on the side of the longer innominate;
2. produces a larger projected obturator foramen;
3. causes an increased lumbar lordosis;
4. lowers the femur head level;
5. causes spongy edema at the posterior-superior margin of the sacroiliac joint;
6. leaves the sacrum anterior on the involved side.

In and Ex Ilium Misalignment

Compound Ilium Misalignments

Chapter 2



Gonstead Chiropractic Science & Healing Art

Chapter 2

In and Ex Ilium Misalignment

In chapter one it was stated that the ilium can become misaligned in relation to the sacrum in four basic directions. That chapter described ilium misalignment in the anterior and posterior directions. This portion of chapter two deals with the mechanics and accompanying changes of medial and lateral ilium misalignment.

The Normal Pelvis

In a properly aligned pelvis the most medial borders of both ilia would be equidistant from the center-line of the sacrum (lines "a" and "b", Figure 25). Also, the center-line of the sacrum, if extended inferiorward, would bisect the juncture of the two innominate bones at the symphysis pubis. Figures 25 and 26 show a normal pelvis in the anterior-posterior and superior-inferior views.

The In and Ex Ilia

In a pelvis with misalignment in the medial and lateral directions, one ilium will have moved further away from the sacral center-line, and the other will have moved closer to the center of the sacrum. This is illustrated in figure 27 by the difference in

Figure 25: *The Normal Pelvis, Anterior-Posterior View.*

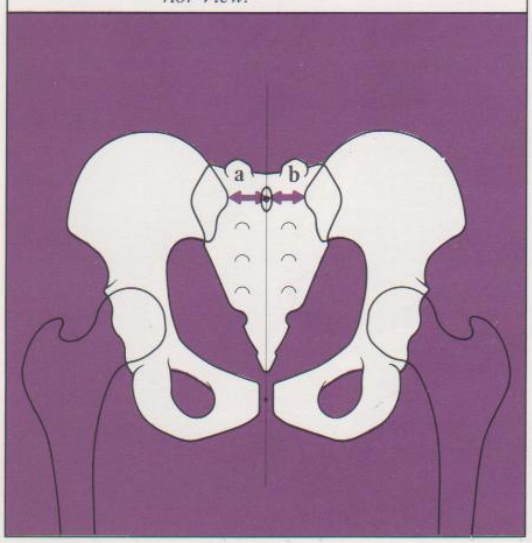
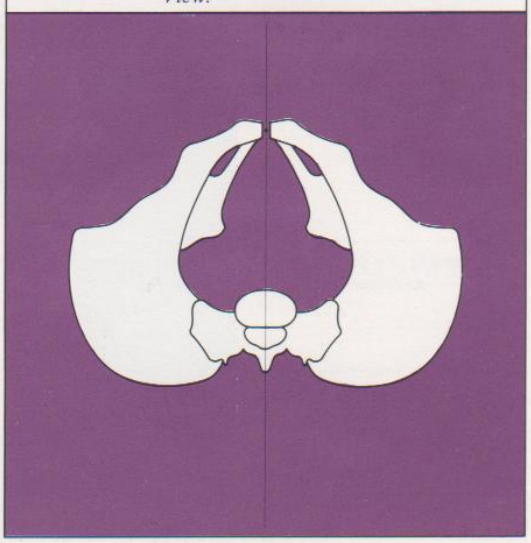


Figure 26: *The Normal Pelvis, Superior-Inferior View.*



distances from the posterior superior spines to the sacral center-line (lines a' and b').

The ilium that has misaligned further away from the sacral center-line is designated as the *external* ilium (EX), and the one closer to the line is the *internal* ilium (IN).

It should be observed that both ilia misalign as a unit around the sacrum, either from right to left, or left to right. The distance between the two posterior superior spines (lines a' *plus* line b', Figure 27) remains the same.

Therefore, in In and Ex misalignment, the relative position of the two ilia remains the same, whereas their position with respect to the sacrum changes.

When the ilia misalign on the sacrum from either right to left, or left to right, the symphysis pubis deviates from the sacral center-line and is located on the film to one side or the other of that line. This is illustrated in figures 27 and 28 in the A–P and S–I views.

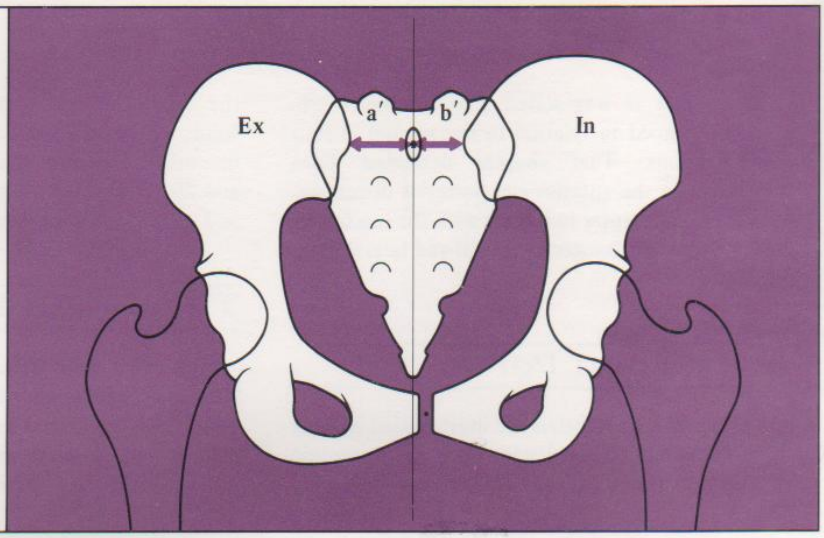


Figure 27: *Ex-In Misaligned Pelvis, A-P View.*

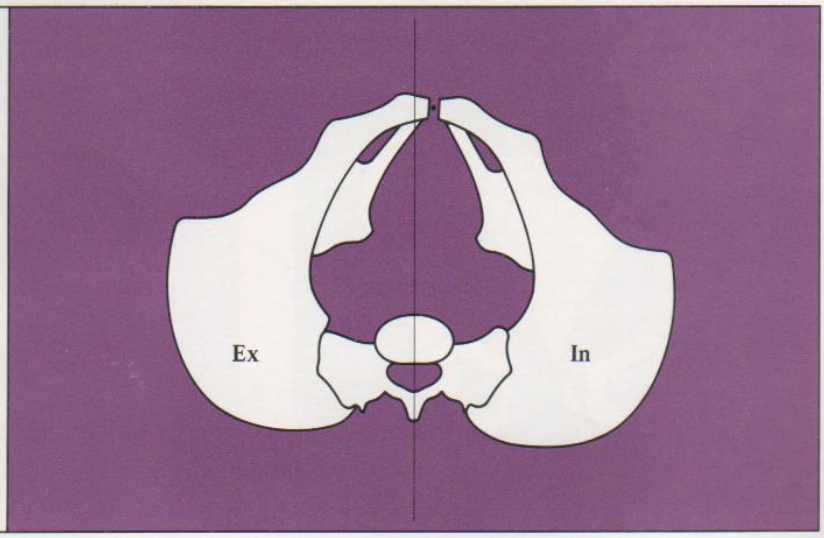


Figure 28: *Ex-In Misaligned Pelvis, S-I View.*

In and Ex Procedure For Measuring

The A–P film is employed to measure external and internal ilium misalignment. The following procedure may be used in marking the film:

1. Place a dot at the center of the first sacral tubercle (Fig. 29).
2. Place a dot at the center of the symphysis (Fig. 29).

Figure 29: *Film with the Dots Placed.*

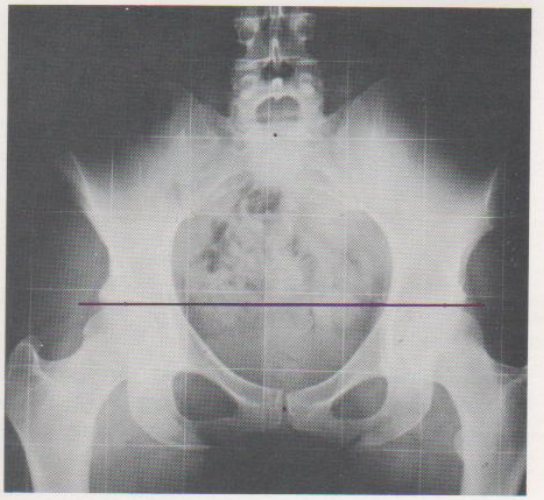
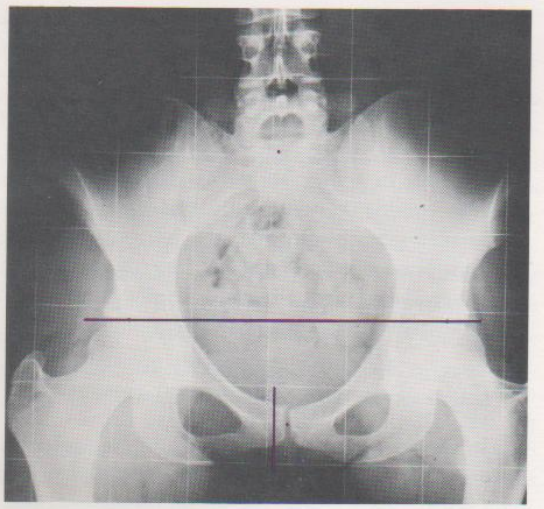


Figure 30: *Film with the Lines Drawn.*



3. Align the Gonstead Radiographic Parallel with the femur head line so that the leading edge of the parallel is perpendicular to the femur head line. NOTE: It is extremely important to have the parallel placed exactly at a 90 degree angle to the femur head line. There are five lines on the parallel which run 90 degrees to the leading edge. These are used to verify that the parallel is correctly placed. Use the middle line when measuring for In and Ex misalignment, so that the leading edge of the parallel extends far enough down to reach the symphysis area. As the line on the parallel is superimposed over the femur head line, roll the parallel across the film to see if the two lines remain superimposed. If not, realign the parallel so that they do. The alignment should always be checked in this way to assure accuracy.
4. Slide the parallel along the femur head line so that the leading edge falls on the dot over the first sacral tubercle.
5. Draw about a two inch line along the leading edge of the parallel at the level of the symphysis. *If there is In and Ex misalignment, the dot in the center of the symphysis will be deviated either to the right or to the left of the two inch line* (Fig. 30).
6. Measure the distance from the dot to the line and place this figure on the film near the symphysis as shown in figure 31.
7. To determine which ilium has misaligned internally and which has moved externally, the following rule is followed: *The symphysis rotates to the side of the* internal *ilium in relation to the two inch sacral center-line*. Why this happens should be quite evident from examining figures 27 and 28.

The Potential Subluxation-The Compensatory Misalignment

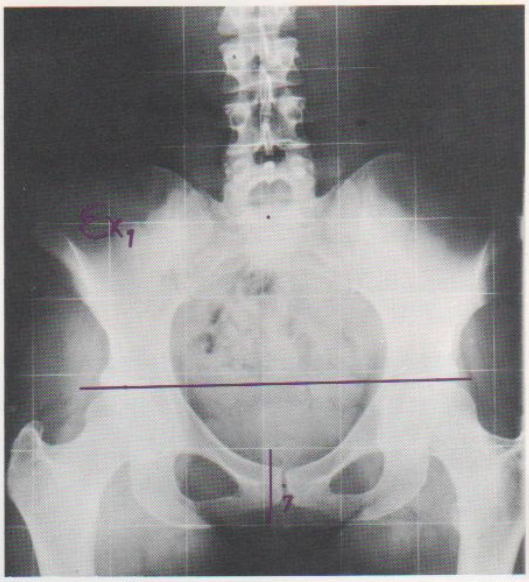
Just as with AS and PI ilium misalignment, only one of the misaligned ilia is actually in a fixed and subluxated condition. The other is in a position of compensatory misalignment. (One exception to this rule will be explained later.)

To determine which is the potential subluxation, as opposed to the compensatory misalignment, the same rule applies as with AS and PI misalignment: *The potentially subluxated ilium is on the side of lumbar body rotation.*

The misaligned ilium on the side of lumbar body rotation is listed on the film as in figure 31. The symphysis has moved to the right of the sacral center-line, toward the side of the In ilium. But because the lumbar bodies have rotated to the left, the left ilium is listed Ex, designating it as the potential subluxation. The number of millimeters of deviation on the film is placed as a subscript along with the listing.

NOTE: A subscript also accompanies the AS or PI listing. This figure is determined by the difference in millimeters between the two innominate measurements. These are not, of course, absolute values in actual millimeters of misalignment, but only give the relative degree of misalignment as compared to other misalignment factors in the pelvis.

Figure 31: *Listing the Ex Ilium.*



Changes Accompanying In and Ex Misalignment

In addition to the lateral displacement of the symphysis on the A–P film, there are other changes which give evidence of In and Ex misalignment. These are helpful to the analyst in cases where the symphysis deviation is slight or nonapparent, owing to sacral tubercle malformation and other possible variations.

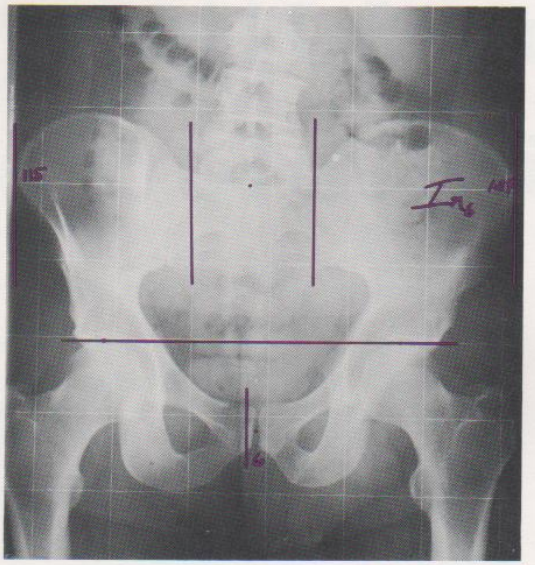
Ilium Width Changes

The widths of the ilia, from the medial to the lateral borders, will be projected differently on the film when In and Ex misalignment exists. The In ilium will appear wider, and the Ex ilium will decrease in width. The following marking procedure may be used as an alternate method for determining Ex-In misalignment on the film.

1. Dots are placed at the medial and lateral borders of both the right and left ilia.
2. The parallel is aligned with the femur head line in the same manner as when measuring for symphysis deviation.
3. As the parallel is moved across the femur head line, the leading edge is aligned with the dots, and four inch lines are drawn. When drawing the lines for the left ilium the leading edge of the parallel should be toward the left border of the film. Then the parallel should be inverted so the leading edge faces the right border of the film while drawing the lines of the right ilium.
4. Measure the widths of the two ilia, and put the figures on the film as shown in figure 32.

The more narrow ilium represents the external ilium, and the wider one the internal ilium. The film is listed accordingly.

Figure 32: *Listing the In Ilium by the Alternate Method.*



Obturator Shape Differences

The projected shapes of the obturator foramina show differences with In and Ex misalignment. The Ex ilium obturator will increase in width at the base, whereas the In ilium obturator will appear more narrow (Fig. 32).

Lumbar Curve Changes

An In ilium will cause the normal anterior curve of the lumbar spine to be decreased. This is a compensatory change similar to that occurring with an AS ilium. The reason is that as the ilium misaligns internally on the sacrum, it also tends to move superiorward, approximating the AS ilium.

The opposite is true of the Ex ilium. The anterior lumbar curve increases as the Ex ilium misaligns on the sacrum, moving posteriorward, and approximating the PI ilium misalignment.

There are accompanying compensatory changes in the thoracic and cervical spines with In and Ex misalignment, similar to those occurring to the AS and PI misalignments respectively. These changes become evident on the lateral film.

Edematous Joint Space

As an ilium misaligns externally on the sacrum, the sacroiliac joint space separates at the posterior portion of the joint, causing a bulging, edematous disc area. This may be evident upon palpating.

A similar situation occurs at the anterior margin of the sacroiliac joint of an In ilium. This area is not palpable, but often gives rise to pain symptoms which lend evidence to internal ilium involvement.

Femur Head Level Changes

The Ex ilium will tend to lower the femur head level in a manner similar to the Pl ilium misalignment. This is due to the ilium moving down the sacroiliac articulation, approximating the Pl ilium position. The opposite situation occurs with the In ilium. As the ilium misaligns internally, it goes further up the articulation, as does the AS ilium, raising the femur head on that side

Foot Flare Changes

More confirming evidence for In and Ex misalignment can be seen by comparing the angle in which the feet diverge from the median line when the patient is in the supine position. One foot must be compared with the other.

The In ilium will tend to cause the foot to diverge further away from the median line, whereas the Ex ilium will tend to cause the foot to converge toward the median line. This can also be observed with the patient in the prone position.

Pelvic rotation can also be observed with the patient standing or walking. The pelvis and feet will be rotated toward the In ilium side. This can also be expressed by saying the torso and head will be rotated toward the side of the Ex ilium.

It should be kept in mind that other factors, such as a knee involvement, may be contributing to the picture.

Compound Ilium Misalignments

In most instances, a pelvis will not misalign along just one plane, such as medialward-lateralward only, or anteriorward-posteriorward only. Instead, the misalignment usually occurs in combination of the two planes, causing a compound ilium misalignment.

Four Compound Ilium Misalignments

There are basically four compound ilium misalignments. Figure 33 shows a left sacroiliac articulation with a vertical and horizontal line running through and crossing at the approximate center of the joint surface (see also Fig. 2, page 2). These lines divide the directions of misalignment into quadrants A, B, C, and D, representing *ASE*x, *ASI*n, *PIE*x and *PII*n misalignments respectively.

During compound ilium misalignment, the asterisk (*), representing the center of the joint surface of the ilium, will move into one of the quadrants. The ilium of the opposite side would have moved into the quadrant diagonal to that one. For example, if the left ilium had misaligned in the ASEx quadrant, the right ilium would be misaligned in the quadrant which is diagonal to ASEx, namely, PIIn.

Although only the four fundamental compound misalignments are designated, there are innumerable possibilities for misalignment in any direction around the 360 degrees of a circle.

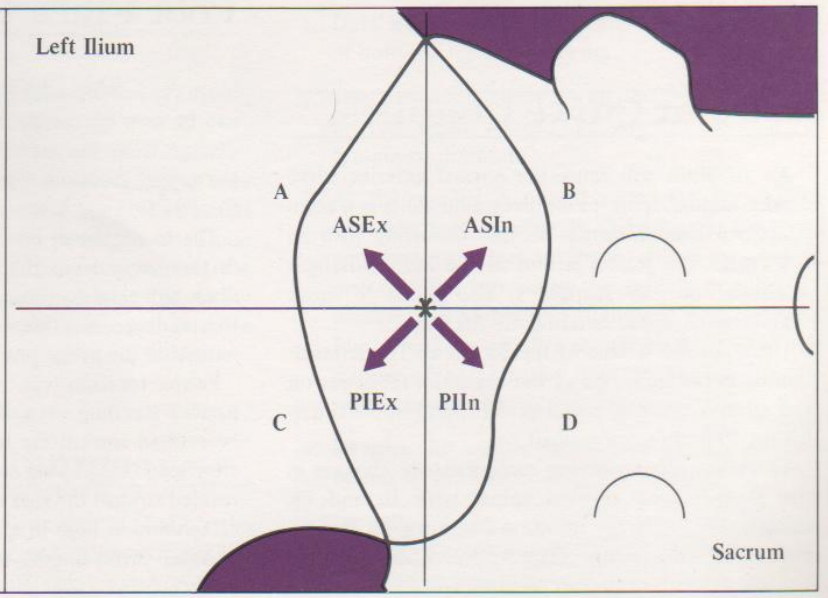


Figure 33: *The Left Sacroiliac Articulation, Showing the Four Possible Directions of Compound Ilium Misalignment.*

Subscripts

The subscripts are used to give more specific information about the compound ilium misalignment. They show the relative amounts of misalignment along the two planes. For example, an $AS_6 In_2$ listing would indicate that the ilium misaligned mostly in the AS direction, with a relatively small amount of internal rotation. On the other hand, a $PI_2 Ex_5$ listing would show there was more external rotation as compared to the PI misalignment.

In the first example above, the six is the difference in innominate measurements, and the two is the number of millimeters of symphysis deviation. Knowing the relative degrees of the two directions of misalignment enables the doctor to effect a more precise corrective thrust, so the reduction can be complete and exact.

Film Marking Procedure

The film marking procedure for determining a compound ilium misalignment is the combined procedures of AS-PI and In-Ex. The anterior-posterior misalignment is first determined as described in Chapter One, followed by the internal-external determination detailed in this chapter (pg. 15).

The film is listed on the side of lumbar body rotation, denoting *that* ilium as the potential subluxation. The opposite ilium is a compensatory compound misalignment, and will not require an adjustment. The compensatory misalignment will be reduced when the subluxation is adjusted.

Changes Occurring with Compound Misalignments

It becomes apparent that compound ilium misalignments cause many varying degrees of changes found on the film and on the patient. The more obvious and useful ones are innumerated below.

ASIn Ilium

Figure 34: *The ASIn Ilium.*

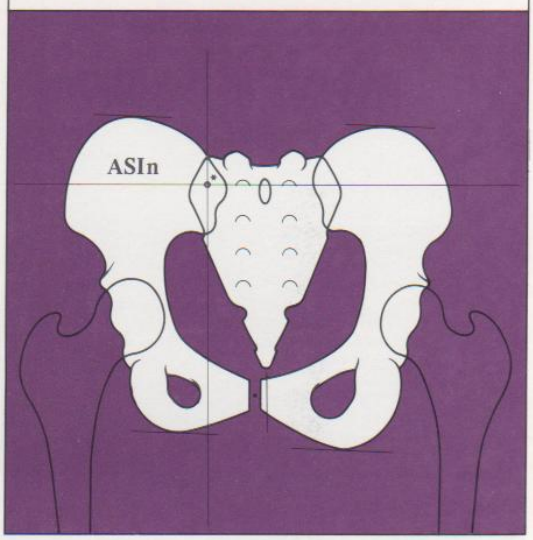
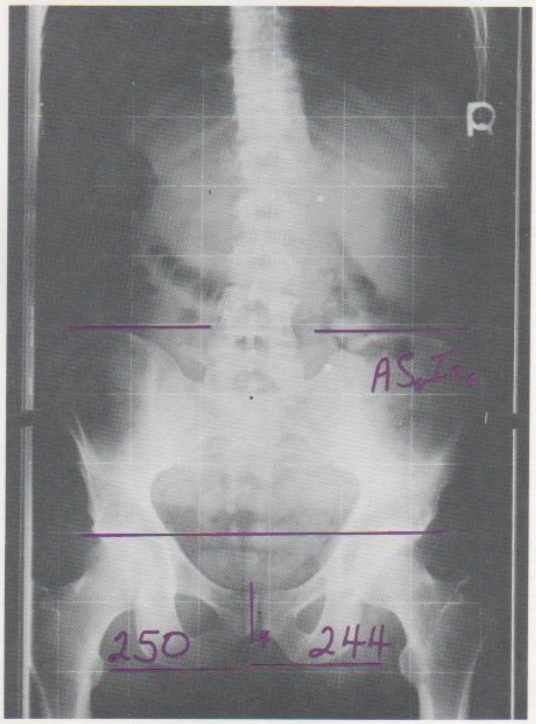


Figure 35: *The ASIn Ilium, Patient's Film Analyzed and Marked.*

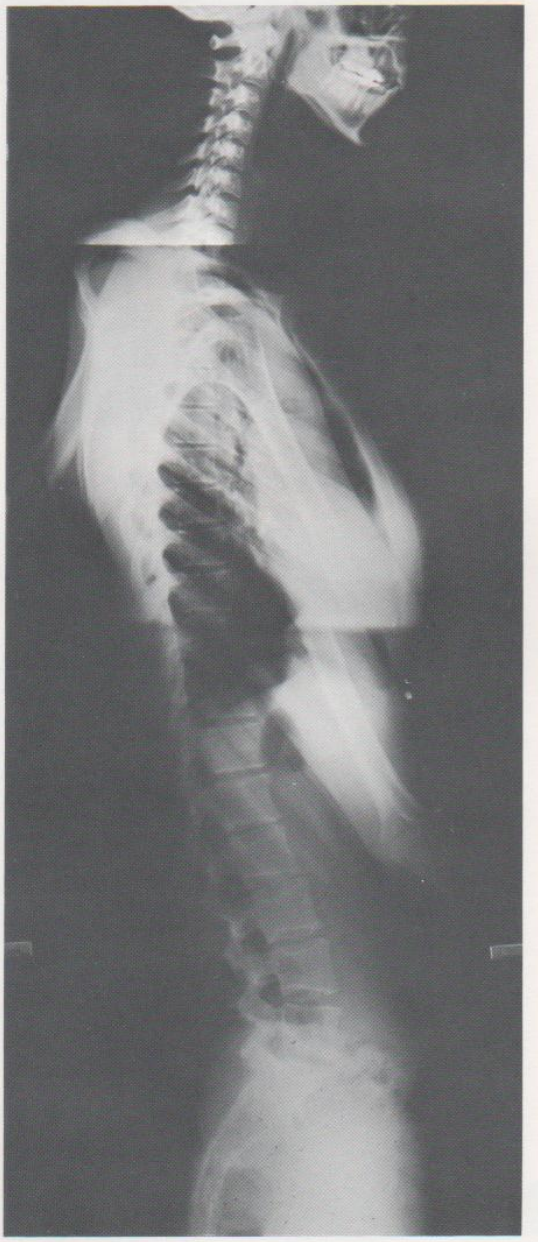


Femur Head Height

AS raises femur head.

In raises femur head.

Figure 36: *A Typical Lateral View of a Severe ASIn Ilium (other factors may be responsible for changes in curves also).*



Combined result: High femur head (Figures 34 and 35). This may be offset by an anatomically short leg, knee or ankle injury, previous fracture, etc., actually causing the PIEx side to be higher. When an ASIn ilium is corrected, the femur head height will be lowered.

Lumbar Curve

AS decreases curve.

In decreases curve.

Combined result: Great loss of lumbar curve (Fig. 36).

Obturator Shape

AS decreases obturator diagonally.

In decreases width at base.

Combined result: Greatly reduced obturator shape (Figures 34 and 35).

Sacroiliac Joint Swelling

AS causes opening of joint space at posterior-inferior margin and anterior-superior margin.

In causes opening in anterior margin.

Combined result: Greater opening of joint on anterior-superior margin.

PIEx Ilium

Femur Head Height

PI lowers femur head height.

Ex lowers femur head.

Combined result: Low femur head (Figures 37 and 38).

Lumbar Curve

PI increases curve.

Ex increases curve.

Combined result: Increased lordosis in lumbar spine (Fig. 39).

Obturator Shape

PI increases diagonally.

Ex increases base of obturator.

Figure 37: *The PIEx Ilium.*

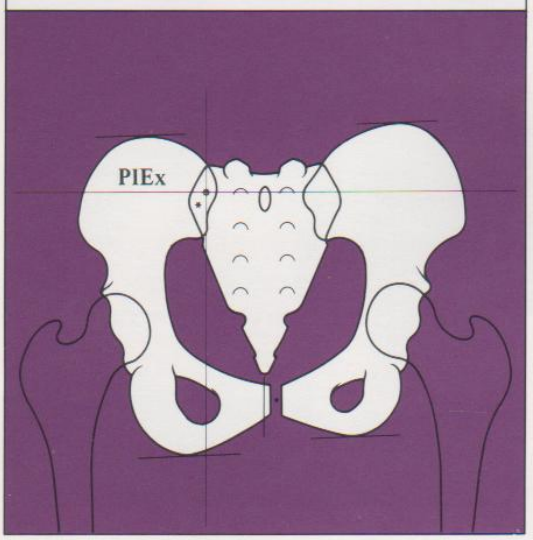
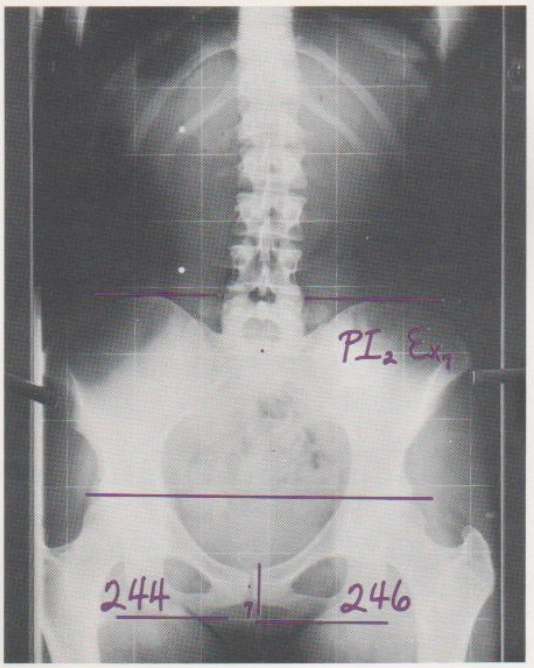
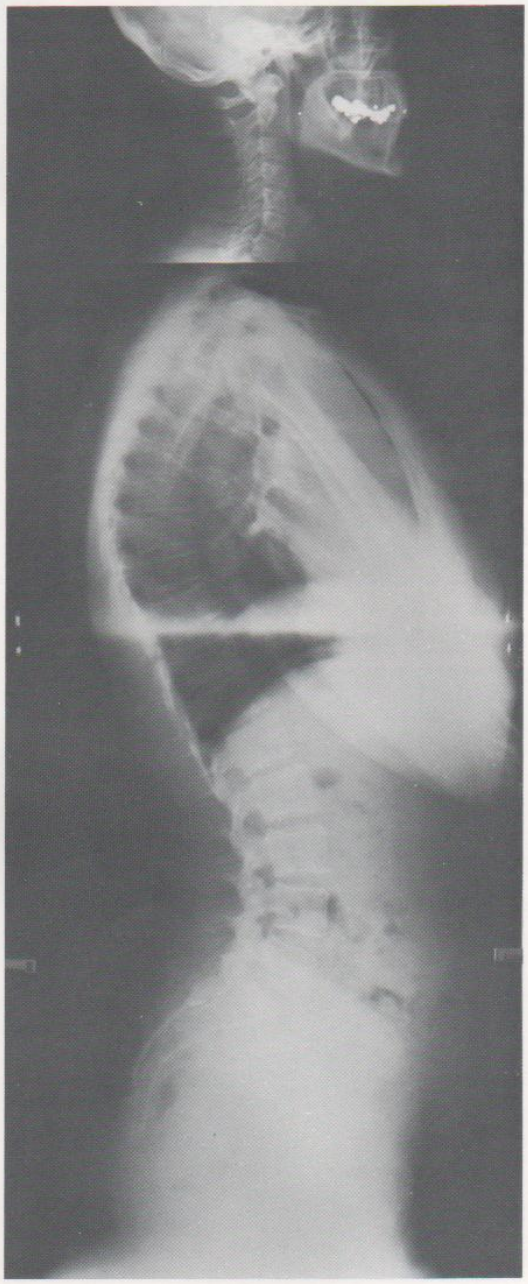


Figure 38: *The PIEx Ilium, Patient's Film Analyzed and Marked.*



Combined result: Greatly increased obturator shape (Figures 37 and 38).

Figure 39: *A Typical Lateral View of a Severe PIEx Ilium (other factors may be responsible for changes in curves also).*



Sacroiliac Joint Swelling

PI causes opening of joint space at posterior-superior and anterior-inferior margins.

Ex opens joint space at posterior.

Combined result: Greater opening of joint at posterior-superior margin.

Ex misalignment, in particular, will be more evident when palpated since it bulges the disc at the posterior. A similar bulging occurs at the anterior with In misalignment, but this cannot be palpated.

ASEx Ilium

Femur Head Height

AS raises femur head.

Ex lowers femur head.

Combined result: Net raising or lowering of femur head, depending on whether AS or Ex predominates (Fig. 41 Low femur head on left indicating predominance of Ex or other factors responsible, such as anatomical short leg, etc.).

Figure 40: *The ASEx Ilium.*

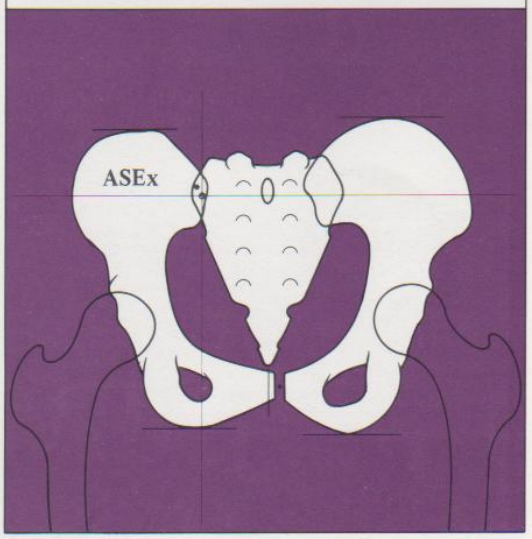
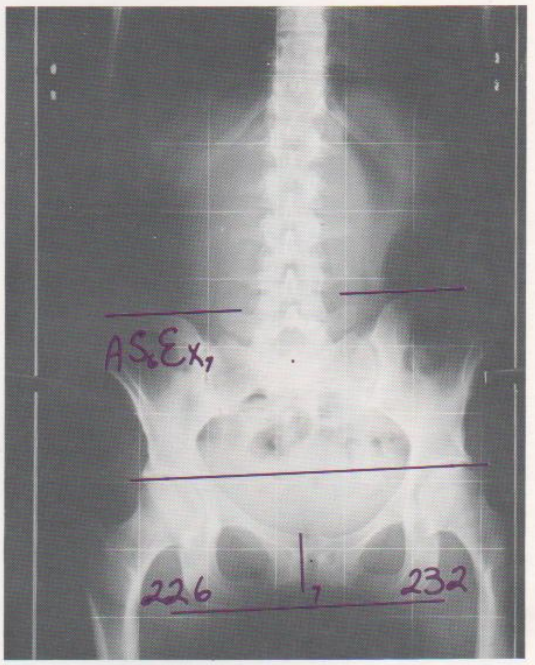


Figure 41: *The ASEx Ilium, Patient's Film Analyzed and Marked.*



Lumbar Curve

AS decreases curve.

Ex increases curve.

Combined result: Depends on whether AS or Ex predominates.

Obturator Shape

AS decreases obturator diagonally.

Ex increases base of obturator.

Combined result: Wide base with decreased oblique measurement (Figures 40 and 41).

Sacroiliac Joint Swelling

AS opens joint at posterior-inferior margin.

Ex opens joint at posterior.

Combined result: Greater opening of joint at posterior-inferior margin.

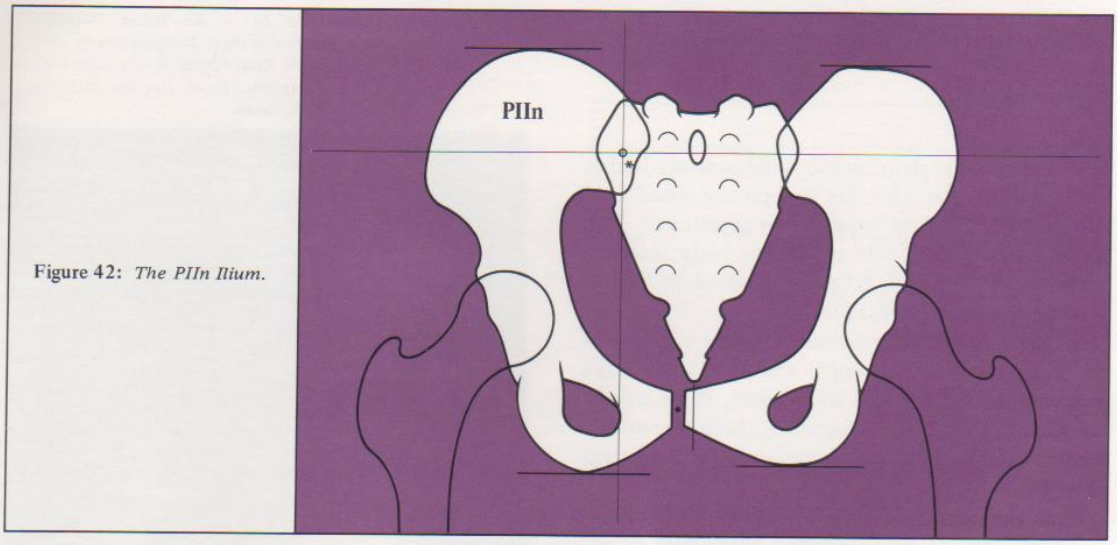


Figure 42: *The PIIn Ilium.*

PIIn Ilium

Femur Head Height

PI lowers femur head.

In raises femur head.

Combined result: Net raising or lowering of femur head, depending on whether PI or In predominates (Fig. 43 High femur head on left, indicating In is predominant, or other factors responsible).

Lumbar Curve

PI increases curve.

In decreases curve.

Combined result: Depends on whether PI or In predominates.

Obturator Shape

PI increases obturator diagonally.

In decreases width at base.

Combined result: Narrow base with increased oblique measurement (Figures 42 and 43).

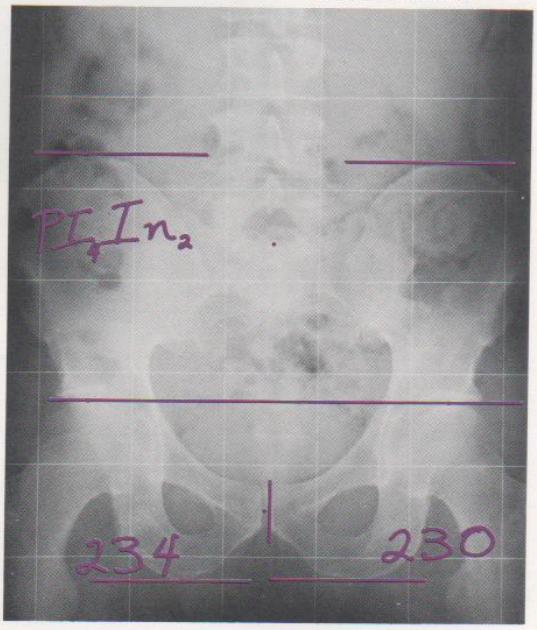
Sacroiliac Joint Swelling

PI opens joint space at anterior-inferior margin.

In opens joint at anterior margin.

Combined result: Increases opening of joint space at anterior-inferior margin.

Figure 43: *The PIIn Ilium, Patient's Film Analyzed and Marked.*



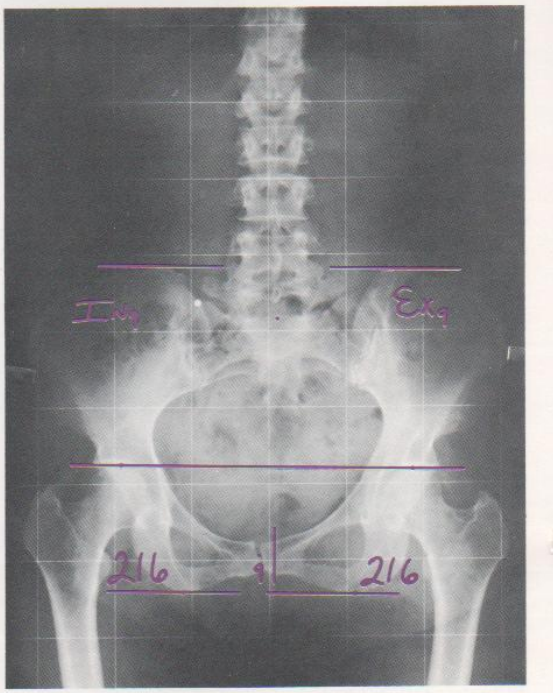
Compound In-Ex or Ex-In Ilium

A general rule about pelvic misalignments is that only one of the two ilia is actually fixed and subluxated, therefore requiring an adjustment. This is the ilium on the side of lumbar body rotation. Earlier in the chapter it was mentioned that there was one exception to this rule.

It is possible to have internal-external rotation of the ilia, where both the right and left ilia are fixed and subluxated. In such an instance, there will be *no* anterior-posterior misalignment (both innominate measurements will be equal) and *no* lumbar rotation (Fig. 44).

When this condition exists, both listings are put on the film. One adjustic thrust is delivered in such a way that both subluxations are reduced simultaneously. When the listing is transferred to the patient's records, both In and Ex are written, with the left one written first, followed by a hyphen, then the right one. For example, if the left ilium is six millimeters In, and the right one is six millimeters Ex, the listing is written In_6-Ex_6. If the left one is six millimeters Ex and the right one six millimeters In, then it is written Ex_6-In_6.

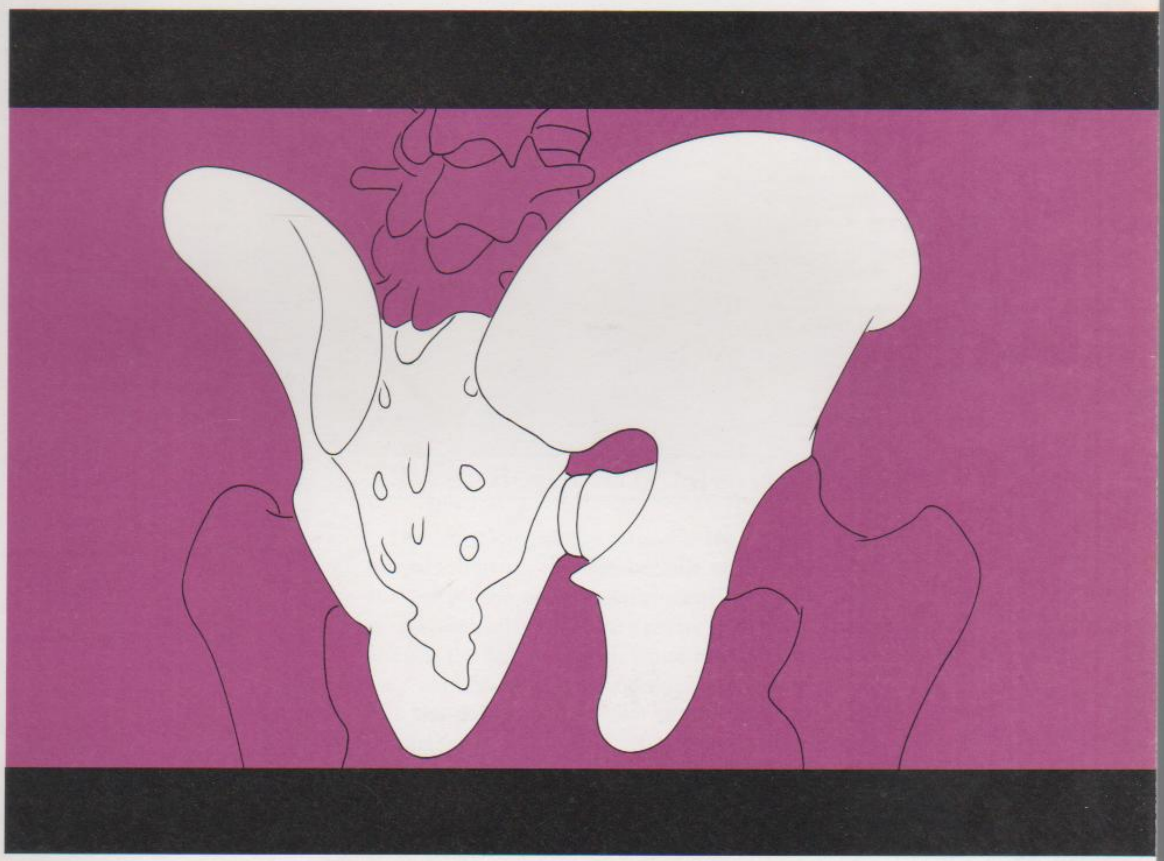
Figure 44: *Compound In – Ex Ilium. Notice that the Innominate Measurements are Equal, and That There is No Lumbar Body Rotation. Both Ilia are Potentially Subluxated.*



Notes

Femur Height Changes with Ilium Misalignment

Chapter 3



Gonstead Chiropractic Science & Healing Art

Chapter 3

Femur Height Changes with Ilium Misalignment

One of the most frequent findings on the radiograph is an apparent difference in the heights of the femur heads. Although there might be an actual difference in leg length, pelvic misalignment may also influence the femur head height.

Chapter three explains how pelvic misalignments, and correction of those misalignments, affect the height of the femur heads as projected on the x-ray film. This must be thoroughly understood before the doctor can prescribe a shoe lift, the purpose of which is to build up, or lengthen, an anatomically deficient leg. The shoe lift is indicated only when the anatomically deficient leg is a factor in the etiology of the patient's subluxations.

Anatomically Short Leg

An anatomically deficient leg is characterized by being actually reduced in length when compared with the opposite leg. This could be caused from trophic disturbances during the growth period, previous fractures, and the like.

Physiologically Short Leg

The physiologically deficient leg is one which *appears* short on the film because of misalignment in the pelvis. The pelvic misalignment causes the degree of perpendicularity of the femurs to change, thereby altering the height of both femur heads. There may or may not also be some anatomical deficiency present. But the shortness is at least partly due to the pelvic misalignment.

After pelvic misalignment is corrected, the physiologically deficient leg could be anatomically shorter or longer than the opposite leg, or it could be of equal length.

In figures 45 through 48, the difference in anatomical and physiological leg deficiency is diagrammatically illustrated. The legs have been separated and obliqued to subserve the explanation of the mechanical principles involved. The distances have been selected arbitrarily. Visualizing the drawings in three dimensions will also aid the reader in understanding the ideas presented.

No Leg Deficiency

In figure 45 both lower extremities are of equal length anatomically. The fixed distance along each femorotibial line is 1000 millimeters.

There is no misalignment of the pelvis. Therefore, the vertical height of each femur head is the same, being 970 millimeters. This allows the femur head line to be parallel with the base line, and exemplifies the case with neither anatomical nor physiological leg deficiency.

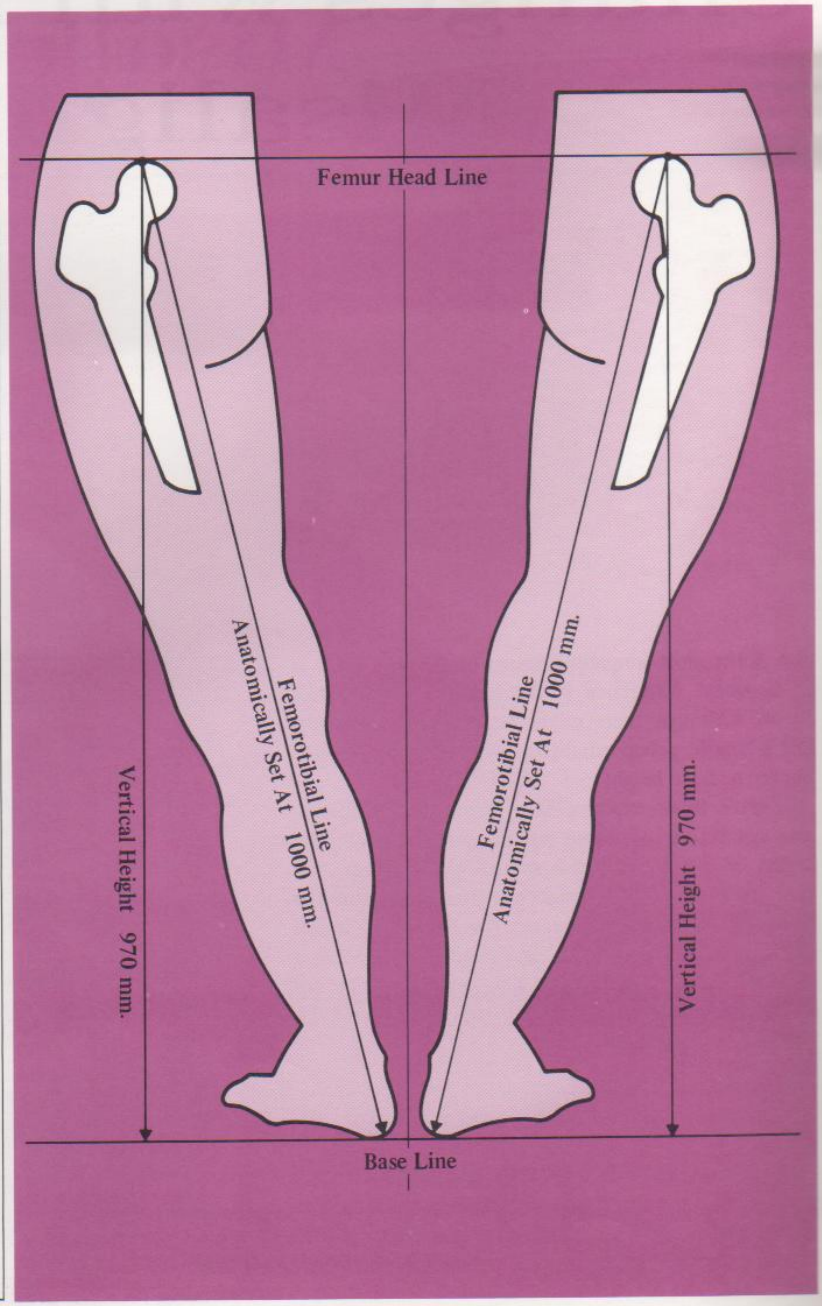


Figure 45: *Both Extremities Equal Length. No Pelvic Misalignment. Both Femur Heads of Equal Height*

Figure 46: *Unequal Femur Head Height Due to Pelvic Misalignment*

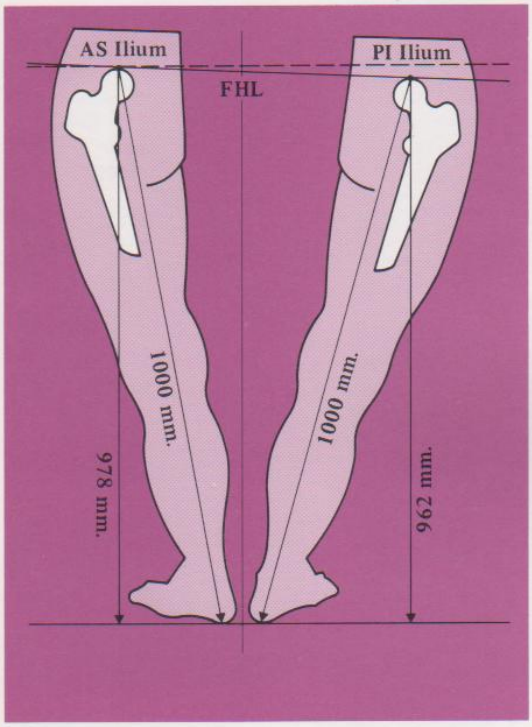
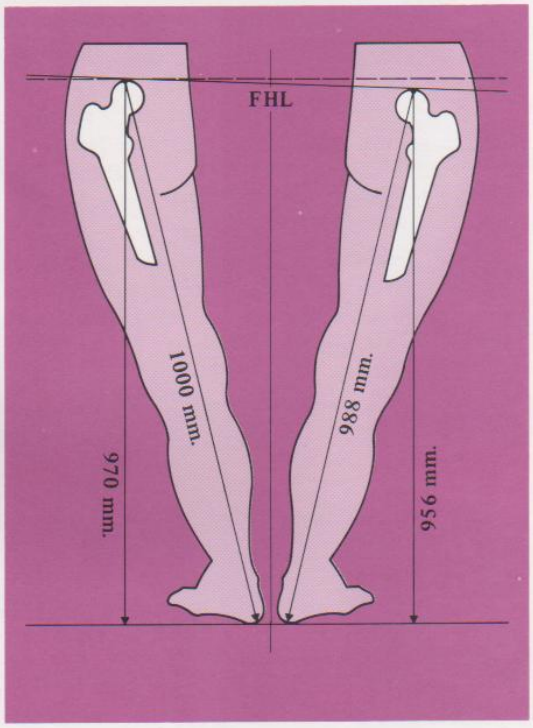


Figure 47: *Unequal Height Due to Anatomical Deficiency*



Physiological Deficiency

Figure 46 represents the same person, only with pelvic misalignment. The anatomical lengths along the femorotibial lines remain at 1000 millimeters, but the vertical heights of the femur heads have changed to 978 and 962 millimeters. The pelvic misalignment has altered the angle of approach of the femur heads in the acetabula. This has changed the perpendicularity of the femurs, which consequently changes their heights. The femur head line is no longer parallel to the base line, since the right femur head is lower than the left. This typifies a case with a physiologically short leg.

Anatomical Deficiency

In figure 47 the individual has one extremity anatomically shorter than the other. No misalignment exists in the pelvis. The inequality in the vertical femur height distances, 956 and 970 millimeters, is due to the anatomical difference instead of from pelvic misalignment. The femur head line is not parallel to the base line because of the anatomically short right leg.

Anatomical and Physiological Deficiency

Figure 48 shows the same individual as in figure 47, only with pelvic misalignment. The anatomically short right leg appears even shorter than it did in figure 47 because pelvic misalignment has changed the perpendicularity of the femurs. Had the pelvic misalignment been in a different direction, for example, AS of the right ilium, the anatomically short right leg may have appeared equal to, or lower than, the left leg.

There are limitless variations in femur head heights because of the many possible combinations of physiological and anatomical leg deficiency.

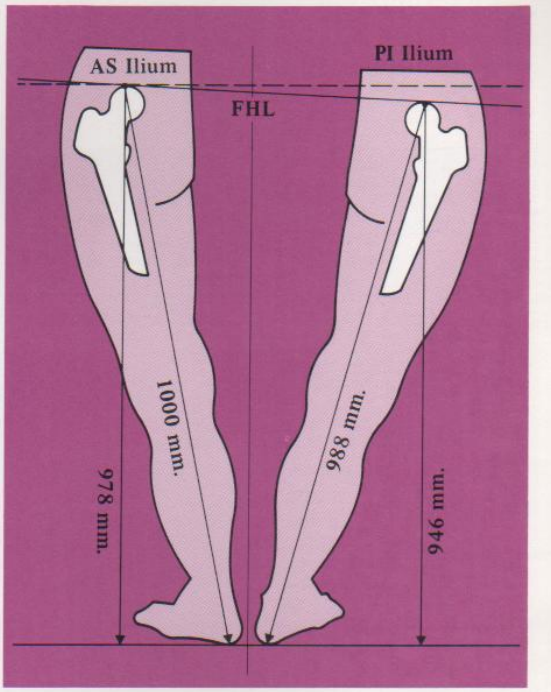
The actual lengths of the two extremities cannot be measured by the x-ray film. However, what can be ascertained is the *difference* between the lengths of the extremities, caused by the anatomical variation. It is this difference that must be known before a shoe lift can be ordered for a patient.

Once the femur head height difference is measured on the film, and the pelvic misalignment factors are determined, it is possible to calculate what the femur head height difference will be *after* the pelvic misalignment factors are corrected.

This determination is possible because pelvic misalignment factors affect the femur head heights in a consistent, measurable way.

The following section will explain the consistent changes that occur in the femur head heights with certain pelvic misalignment factors.

Figure 48: *Unequal Height Due to Pelvic Misalignment and Anatomical Deficiency*



AS and In Raise Femur Head

Figure 49 illustrates a film projection of a person with no anatomical leg length difference and no pelvic misalignment. This is also represented in figure 45. The femur head line is parallel to the base line. NOTE: The base line is represented on the film by the horizontal grid lines of the A-P cassette, or the horizontal border of the film. This presupposes proper bucky alignment.

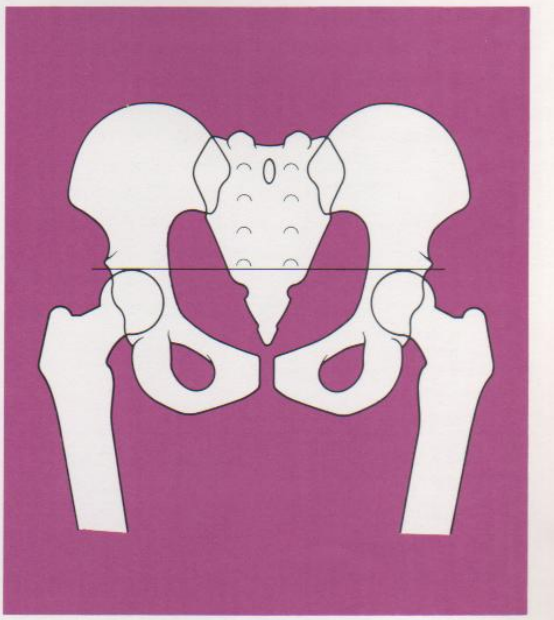
If this same person were to acquire 5 mm. of AS misalignment of the right ilium, the right femur head would be raised 2 mm. when compared to the left femur head (Fig. 50). If the AS_5 misalignment were corrected, the two femur heads would again be level.

If the patient represented in figure 49 acquired 5 mm. of In misalignment of the right ilium, the right femur head would be raised 2 mm. (Fig. 51). Once again, by correcting the In_5, both femur head heights would be equal.

If 5 mm. of AS *and* 5 mm. of In were acquired, allowing a compound ilium misalignment of $AS_5\,In_5$, the femur head would be raised 4 mm.

From the foregoing information, the following rule is established: For every five millimeters of AS or In ilium misalignment, the respective femur head will be raised two millimeters.

Figure 49: *Normal Pelvis: No Leg Deficiency, Level Femur Head Line*



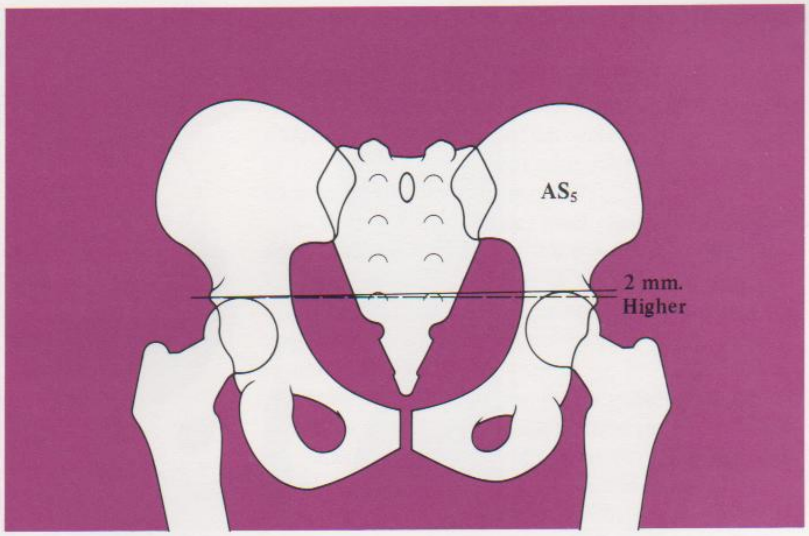


Figure 50: *AS_5 Raises Femur 2 mm.*

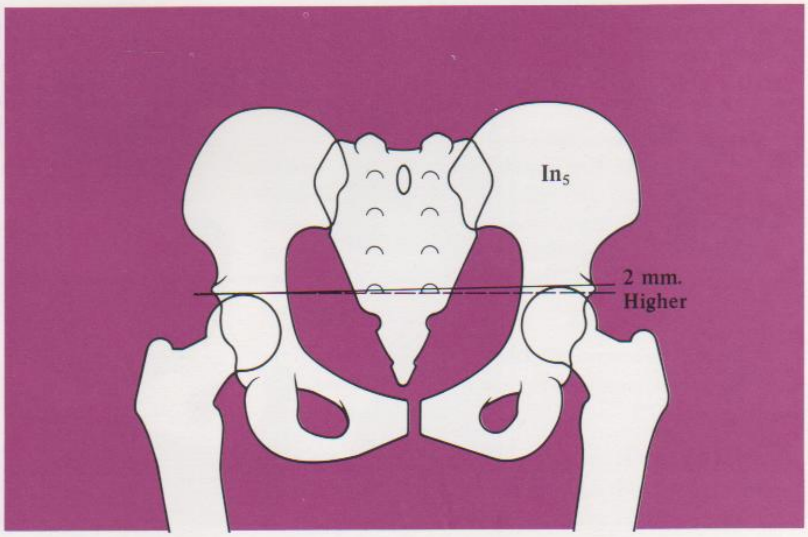


Figure 51: *In_5 Raises Femur 2 mm.*

PI and Ex Lower Femur Head

If the person in figure 49 acquired 5 mm. of PI misalignment in the right ilium, the right femur head would be lowered 2 mm. (Fig. 52). When corrected, the height of both femur heads would be equal.

If the individual had 5 mm. of Ex misalignment on the right ilium, the right femur head would be lowered 2 mm. (Fig. 53). Again, when corrected, both femur heads would be equal in height.

With a compound ilium misalignment of $PI_5\,Ex_5$, the femur head would be lowered 4 mm.

This establishes the following rule: For every five millimeters of PI or Ex ilium misalignment, the respective femur head will be lowered two millimeters.

Since the doctor is more concerned with what happens to the femur head height when the pelvic misalignment is *corrected*, the two preceding rules will be stated from that point of view.

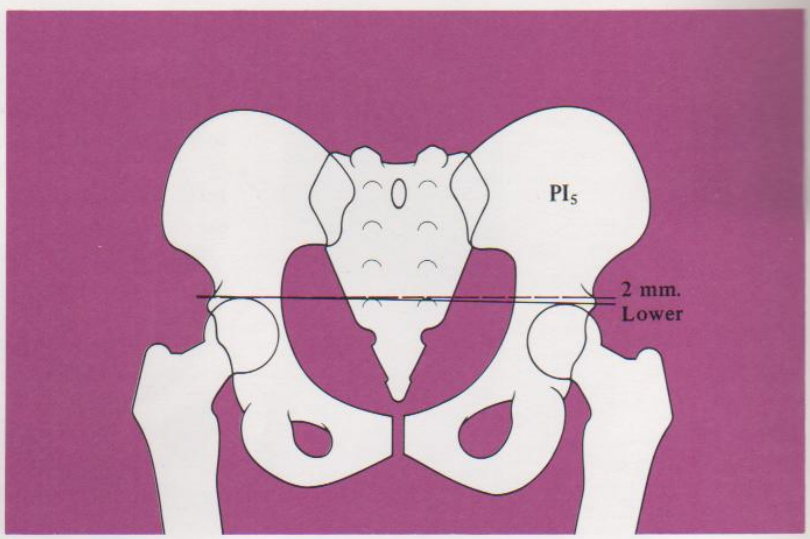


Figure 52: *PI_5 Lowers Femur 2 mm.*

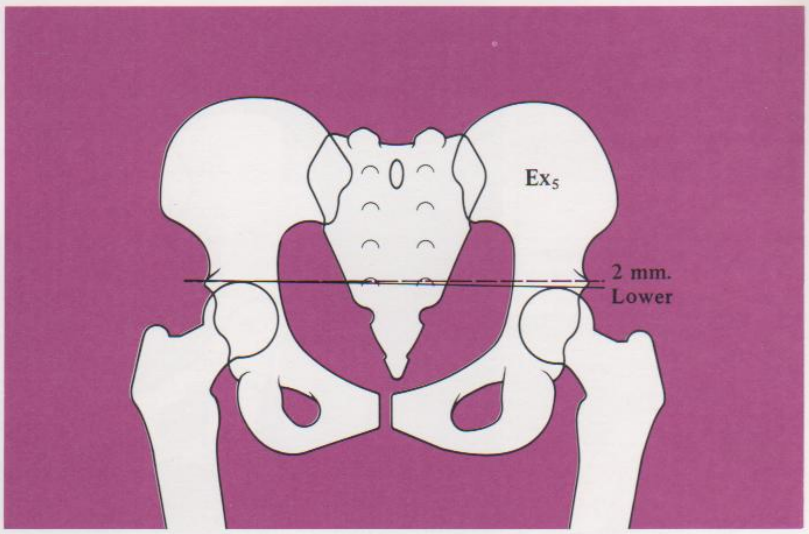


Figure 53: *Ex_5 Lowers Femur 2 mm.*

Rules for Correction

1. *For every five millimeters of AS or In correction, the femur head height will be lowered two millimeters.*
2. *For every five millimeters of PI or Ex correction, the femur head height will be raised two millimeters.*

Through the application of these rules, one can calculate the changes that occur in the height of the femur heads when ilium misalignments are corrected.

Note the changes that occur in the femur head heights in the following compound ilium listings.

$AS_{10}Ex_5$

AS_{10} correction lowers femur head 4 mm.

Ex_5 correction raises femur head 2 mm.

Total effect of $AS_{10}Ex_5$ ilium correction: femur head

lowered 2 mm.

AS_5In_{10}

AS_5 correction lowers femur head 2 mm.

In_{10} correction lowers femur head 4 mm.

Total AS_5In_{10} ilium correction lowers femur head 6 mm.

$PI_{10}In_5$

PI_{10} correction raises femur head 4 mm.

In_5 correction lowers femur head 2 mm.

Total effect of $PI_{10}In_5$ ilium correction: femur head raised 2 mm.

$PI_{10}Ex_{10}$

PI_{10} correction raises femur head 4 mm.

Ex_{10} correction raises femur head 4 mm.

Total $PI_{10}Ex_{10}$ ilium correction aises femur head 8 mm.

AS_5Ex_5

AS_5 correction lowers femur head 2 mm.

Ex_5 correction raises femur head 2 mm.

Total effect of AS_5Ex_5 ilium correction: no change in femur head height.

Seldom is the patient so cooperative as to present his ilium listing in increments of five millimeters, as the text examples might indicate. However, the femur head height can easily be interpolated whatever misalignment factors are measured.

Take, for example, the listing AS_7In_3. The AS_7 correction will lower the femur head slightly less than three millimeters (7.5 millimeters would lower it 3 mm.). The In_3 correction would lower the femur head slightly more than one millimeter (2.5 mm. would lower it 1 mm.). The total effect of the correction would therefore be approximately four millimeters.

Likewise, with a PI_2Ex_6 ilium listing, the total effect of correction would be approximately three millimeters since the PI_2 correction would raise the femur head almost one millimeter, and the Ex_6 correction would raise it slightly more than two millimeters.

Correcting ASEx and PIIn listings will often have little effect on altering the femur head height difference shown on the film, unless, of course, one of the two basic directions of misalignment predominates significantly over the other.

In figuring the femur head height difference, accuracy within a fraction of a millimeter is hardly necessary. In fact, considering the variables inherent in x-ray projection measurements and the individual's response to misalignment correction, such accuracy would be excessive.

In spite of these variables, the procedures given here provide a workable, accurate method for determining the shoe lift size that will most favorably accommodate the patient. Fortunately, the range of adaptation on the part of the patient when wearing a shoe lift allows some latitude in the selection of the exact size.

The Actual Difference

Now that it has been established how correcting certain pelvic misalignments will affect the femur head height, this information can be used to determine the actual femur head height difference in the patient after his pelvic misalignments are corrected. We must first measure the femur height difference on the film.

The following film marking procedure should be used on the A-P film for determining the projected femur height difference.

1. Place the radiographic parallel above the femur head line with the leading edge directed upwards. Align the leading edge with one of the horizontal grid lines (Fig. 54).
2. Slide the parallel down until the leading edge is even with the top of the *higher* femur head (Fig. 55).
3. Draw a three inch line along the leading edge of the parallel over the *lower* femur head (Fig. 56).
4. Using the millimeter scale along the lateral edge of the parallel, measure the distance between the three inch line and the femur head line. This measurement must be made *directly above the femur head*, and not near the edge of the film where the two lines have diverged. Put the

appropriate figure on the film as shown in figure 57. This represents the deficiency of the low femur head on the film, expressed in millimeters, and is designated as the *measured difference* (abbreviated m.d.).

Having first established the measured difference, the doctor can now calculate the *actual difference* (abbreviated a.d.), which is the true anatomical deficiency of the short femur found after the pelvic misalignment is corrected.

Figure 54: *Align the Parallel With a Horizontal Grid Line.*

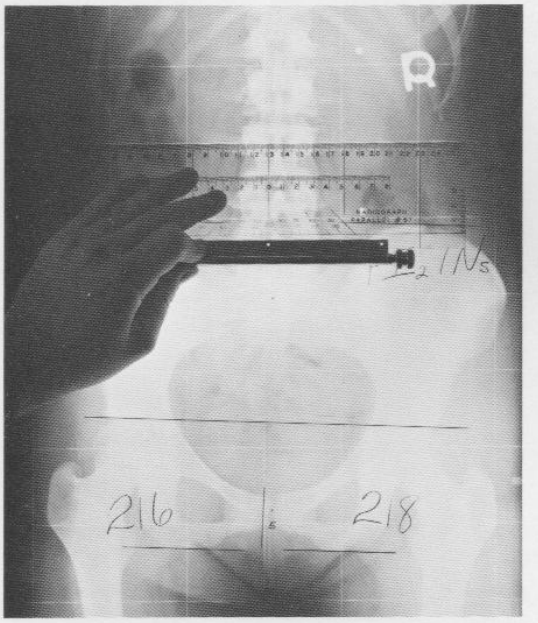


Figure 55: *The Leading Edge is Even With the Higher Femur.*

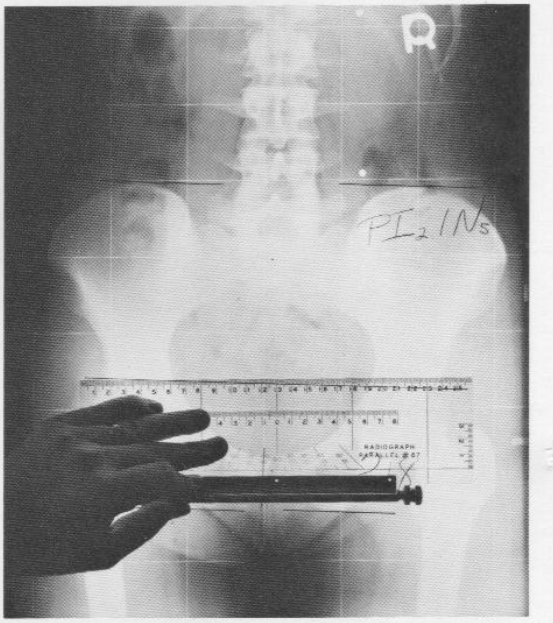


Figure 56: *Drawing Three Inch Line.*

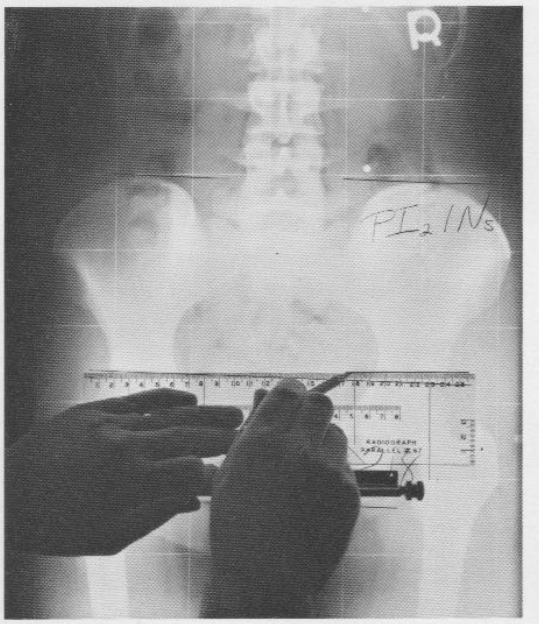
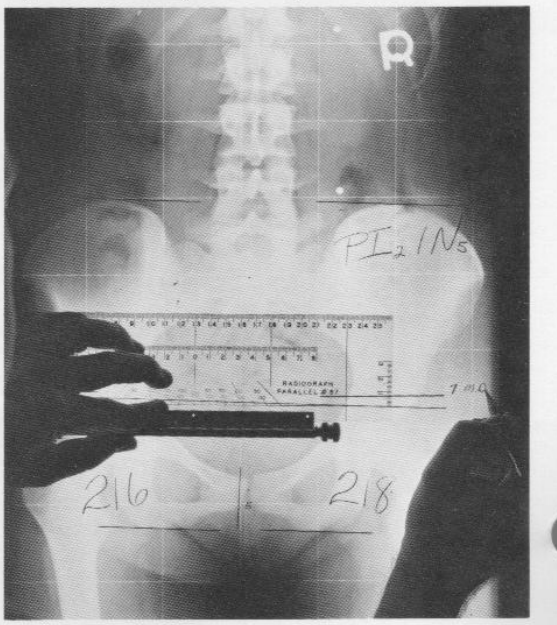


Figure 57: *Measuring and Marking.*



Calculating the Actual Difference

Figure 58 illustrates a case with ten millimeters of measured deficiency of the right femur head, and an ilium misalignment of $AS_5\,In_5$ of the right ilium.

Correction of the AS_5 will lower the femur head two millimeters, causing the femur head to be shorter by two millimeters. Correcting the In_5 will also lower the femur head two millimeters. The actual difference, after total ilium correction, will be 14 mm. since the correction factor of 4 mm. is added to the 10 mm. measured difference.

Figure 59 represents a patient with ten millimeters measured deficiency of the right femur head and a listing of $AS_5\,In_5$ on the *left* ilium. The left ilium is listed on the film since it is the side toward which the lumbar bodies have rotated (not shown). Recall that when the left ilium is listed $AS_5\,In_5$, the right ilium has a misalignment factor of $PI_5\,Ex_5$. Since the doctor is concerned with how the *low* femur head will change when total pelvic correction is achieved, the misalignment factor of the ilium corresponding to that femur head may be used for the calculation. Remember that the compensating ilium misalignment will be corrected when the subluxated ilium is adjusted.

Therefore, when the PI_5 is corrected, the low femur head will be raised two millimeters. Correcting the Ex_5 will raise it two more millimeters. The total correction will raise the low femur head 4 mm., establishing an actual difference of 6 mm.

Figure 60 shows a patient with six millimeters measured difference on the left femur head and a listing of $AS_{10}Ex_5$ on the left ilium.

Figure 58: *AS_5In_5 Correction Lowers Femur Head 4 mm.*

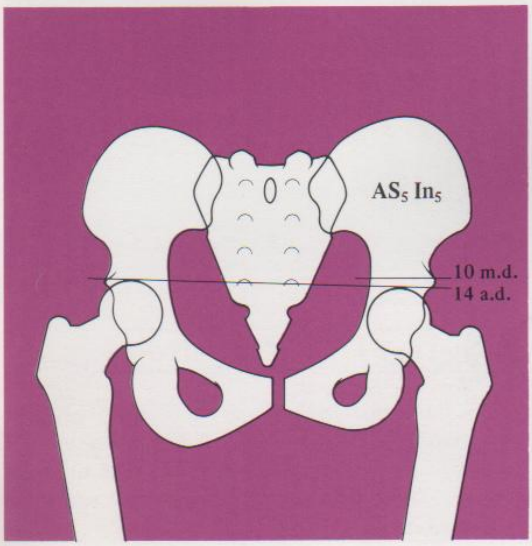


Figure 59: *AS_5In_5 Correction Raises Femur Head on Opposite Side 4 mm.*

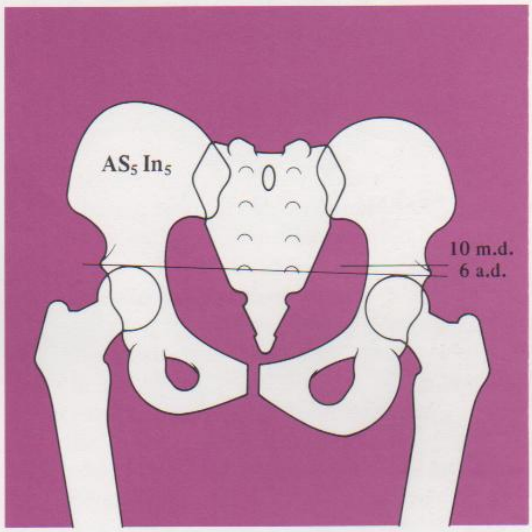


Figure 60: *$AS_{10}Ex_5$ Correction Lowers Femur Head 2 mm.*

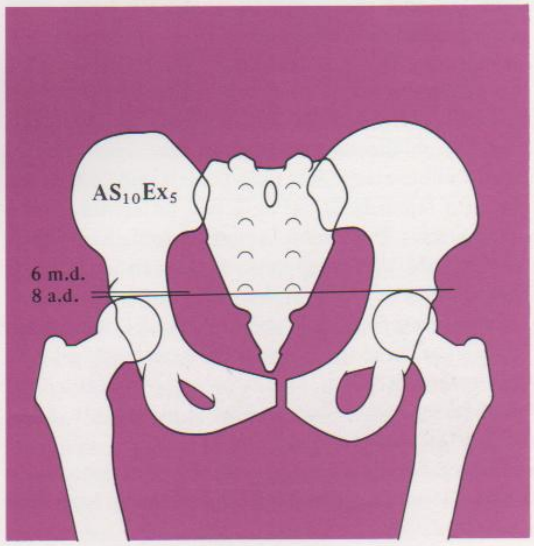
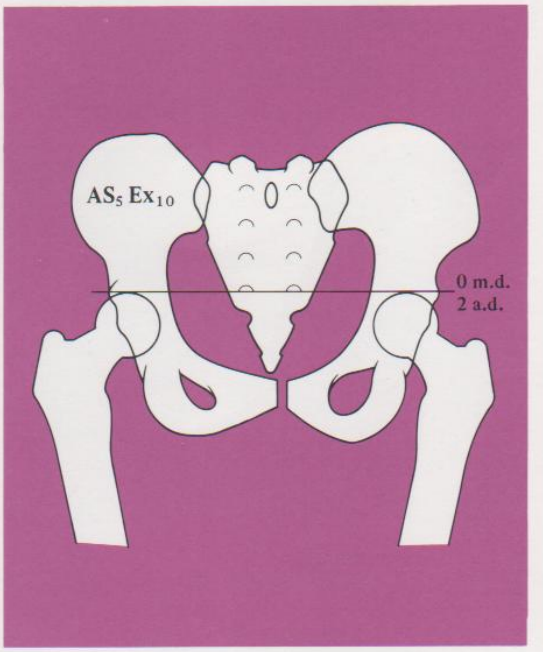


Figure 61: *AS_5Ex_{10} Correction Lowers Femur Head on Opposite Side 2 mm.*



Correcting the AS_{10} will lower the left femur head 4 mm., while the Ex_5 correction will raise it 2 mm. Thus, the actual difference is 8 mm.

Figure 61 illustrates a patient with an $AS_5\,Ex_{10}$ listing of the left ilium, and shows no measured difference on either femur head. That is, both femur heads measure the same height, and the femur head line is parallel to the base line.

Correcting the AS_5 will lower the left femur head two millimeters, making it two millimeters deficient. However, correcting the Ex_{10} will raise the left femur head four millimeters, causing the *right* femur head to be two millimeters lower than the left one. Therefore, the right femur head has an actual difference of two millimeters. This same result would have been reached had the computation been made with the misalignment of the right ilium ($PI_5\,In_{10}$).

These examples have shown typical ilium listings and femur head deficiencies in increments of five millimeters for easy calculations. Once again, any misalignment factors other than in increments of five millimeters must be interpolated.

Figures 62 through 65 show films of patients in which the measured and actual differences have been calculated.

Figure 62: *8 mm. Actual Difference. Shoe Lift May Be Indicated.*

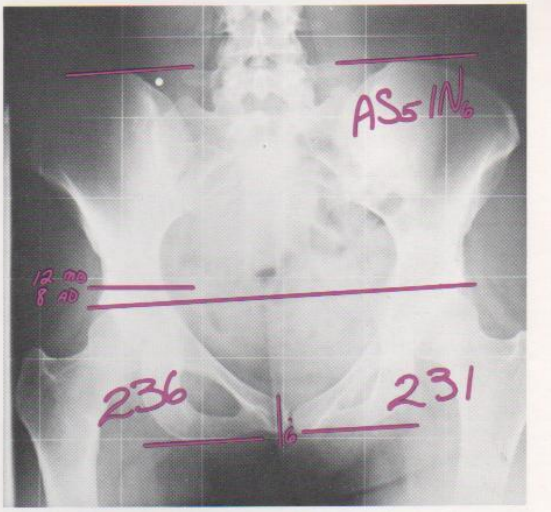
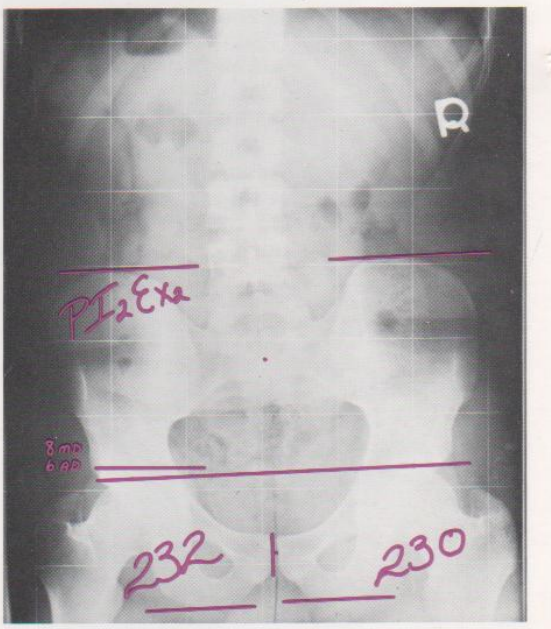


Figure 63: *6 mm. Actual Difference. Patient Should Be Able to Adapt.*



When a Lift is Indicated

Once the actual difference is established the doctor must consider whether or not a shoe lift will be of benefit to the patient. The mere fact that an actual difference exists is not in itself sufficient reason to prescribe a lift.

Figure 64: *11 mm. Actual Difference. Shoe Lift Should Be Considered.*

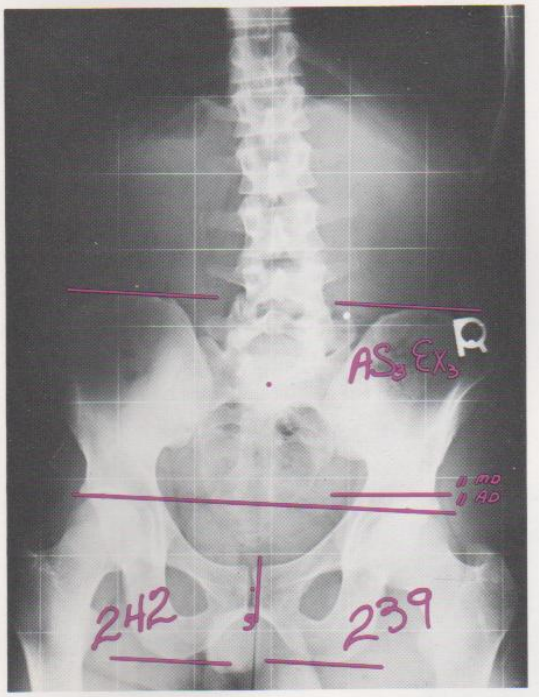
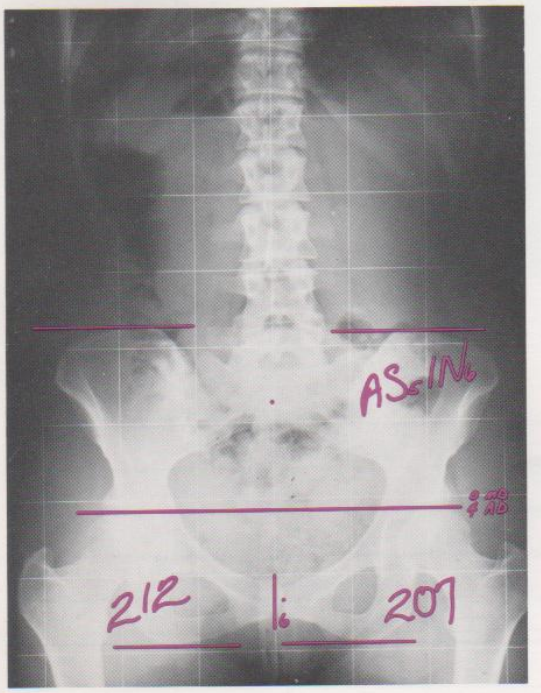


Figure 65: *4 mm. Actual Difference. Patient Should Be Able to Adapt.*



The main consideration involves the patient's ability to retain his adjustments in the pelvis or spinal column. Obviously, a deficiency in leg length will predispose the patient to subluxations, due to the instability it causes.

Experimentation has shown that *most people can adapt to a femur head deficiency of up to six millimeters without having it be an important element in their ability to retain adjustments.* With any person having seven or more millimeters deficiency, a lift may be indicated. The decision must be based on the patient's responses, although the greater the deficiency, the more likely the need.

Borderline cases must be closely evaluated, the final judgment resting on what part the leg deficiency plays in the patient's subluxations, and on what aid he may derive from having his pelvis leveled.

In the previous examples shown, the persons in figures 58, 60, 62 and 64 should be considered for a lift, whereas those in figures 59, 61, 63 and 65 should be able to adapt to the leg deficiency, and not require a lift.

When a lift *is* prescribed, it should be ordered for the *full amount* of the actual difference. For example, the patient in figure 58 would require a lift of 14 mm., and the patient in figure 60 would need a lift of 8 mm.

Shoe Lift Contraindicated

There are two important contraindications for a shoe lift, the violation of which would be deleterious to the patient.

Direction of Lumbar Scoliosis

Ordinarily, a lumbar scoliosis is a compensatory adaptation to a tilted pelvis caused by a short femur head. The lateral curve would normally be on the side of the lower femur head. Raising the lower femur head with a lift would decrease the scoliosis.

In certain cases of sacral or fifth lumbar malformation, the lumbar scoliosis may be on the side of the higher femur head. Therefore, to raise the low femur head with a lift would tend to increase the scoliosis on the opposite side. The rule to remember is to *never prescribe a lift for a patient when the*

Figure 66: *Lumbar Scoliosis on Opposite Side of Low Femur. Shoe Lift Contra-indicated.*

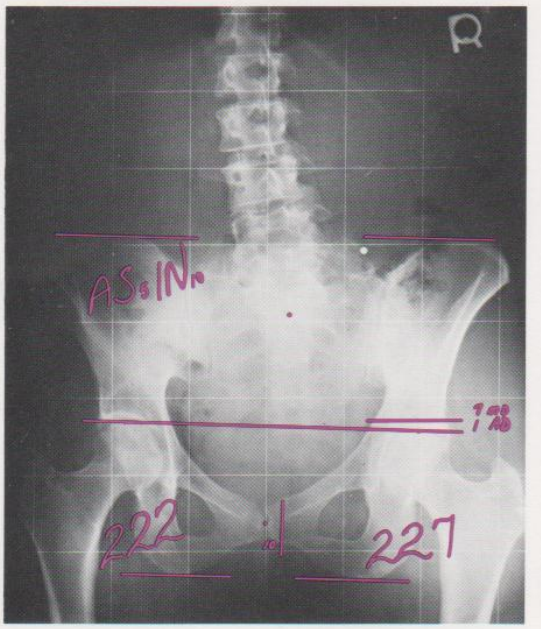
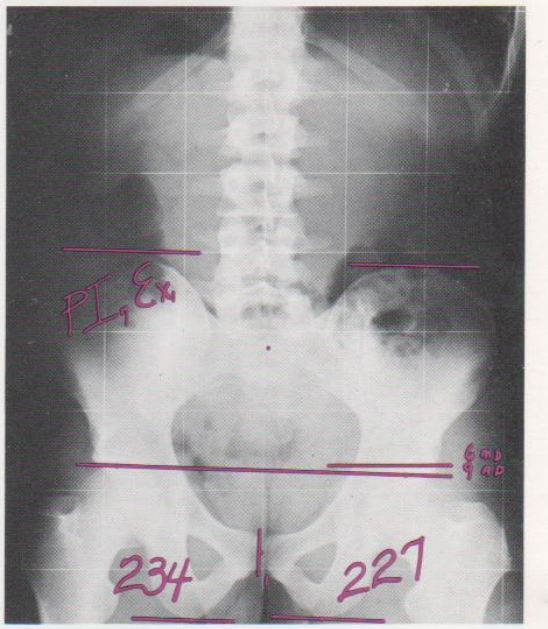


Figure 67: *Lumbar Body Rotation on Opposite Side of Low Femur. Shoe Lift Contra-indicated.*



lumbar scoliosis is on the opposite side of the low femur head. Such an example is illustrated in figure 66.

Direction of Lumbar Body Rotation

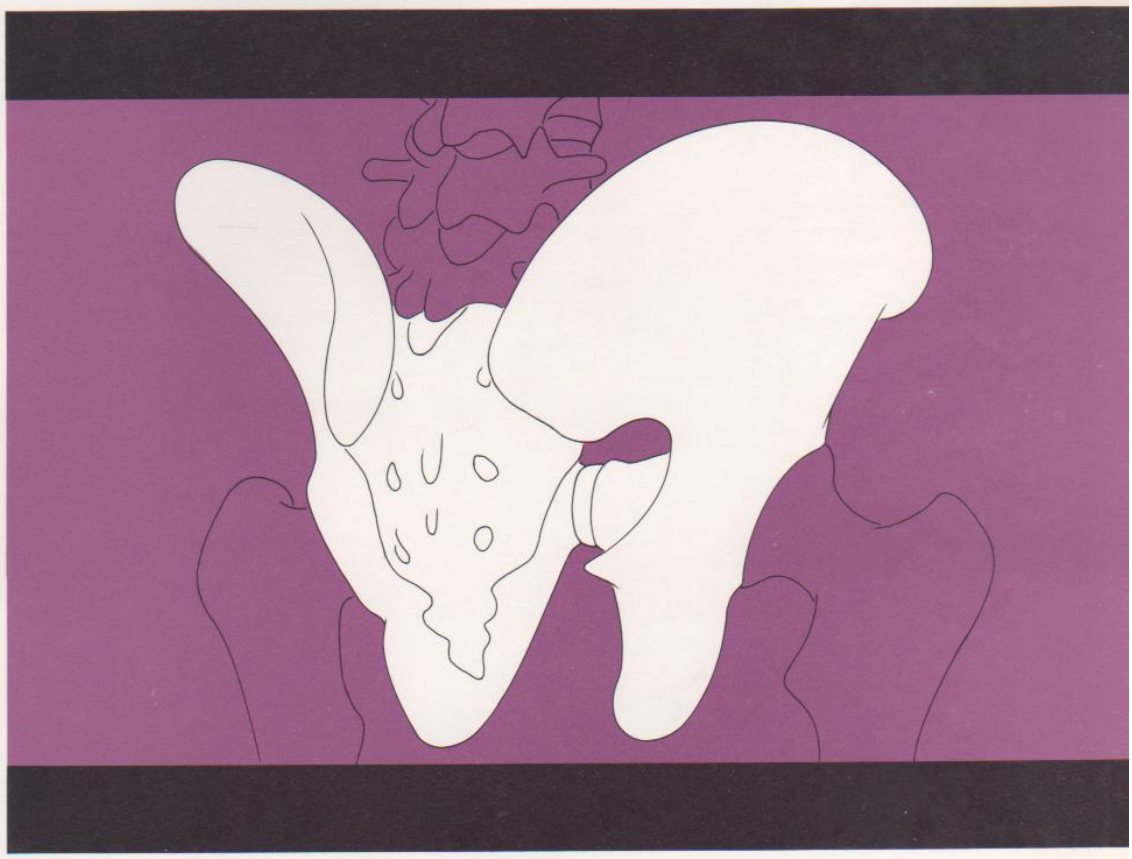
Anatomical leg deficiency causes the fifth lumbar body to rotate toward the side of the short femur head. Conversely, correcting for anatomical leg deficiency with a lift will tend to rotate the lumbar body back toward center.

If a patient is found to have lumbar body rotation to the opposite side of the short femur head, then raising the low femur head would tend to rotate the lumbar body still further away from center. The rule to remember is to *never prescribe a lift for a patient when the lumbar bodies have rotated to the opposite side of the low femur head*. Some factor other than the anatomically short leg has caused the lumbar body to rotate to the opposite side. Such an example is illustrated in figure 67.

Notes

Sacral Misalignments

Chapter 4



Gonstead Chiropractic Science & Healing Art

Chapter 4

Sacral Misalignments

When the sacrum becomes subluxated, it may have misaligned at one of the sacroiliac articulations, or at the lumbosacral articulation. Sometimes both areas are involved simultaneously.

Because of its relative complexity, many doctors find the sacral subluxation confusing and difficult to analyze. Compounding the confusion is the fact that posteriorward is the direction the sacrum slips when it misaligns with an ilium or the fifth lumbar vertebra. Therefore, the listing "posterior sacrum" has no definitive meaning unless we specify which sacral articulation we are dealing with.

Chapter four explains the kinds of sacral misalignments so they can be clearly visualized and differentiated. Having a clear mental picture of the misalignment is essential before corrections can be effectively made. An explanation of coccygeal misalignment is also included in this chapter.

Sacral Misalignment at the Sacroiliac Articulation

Preceding chapters explained how the ilia may become misaligned with the sacrum. It was said that when an ilium problem exists, the misalignment occurs at the sacroiliac joint. It was further pointed out that ilium misalignment involves both ilia simultaneously, and that each may have a listing equal in degree but opposite in direction.

We will now consider the condition where the ilia remain relatively intact with respect to each other,

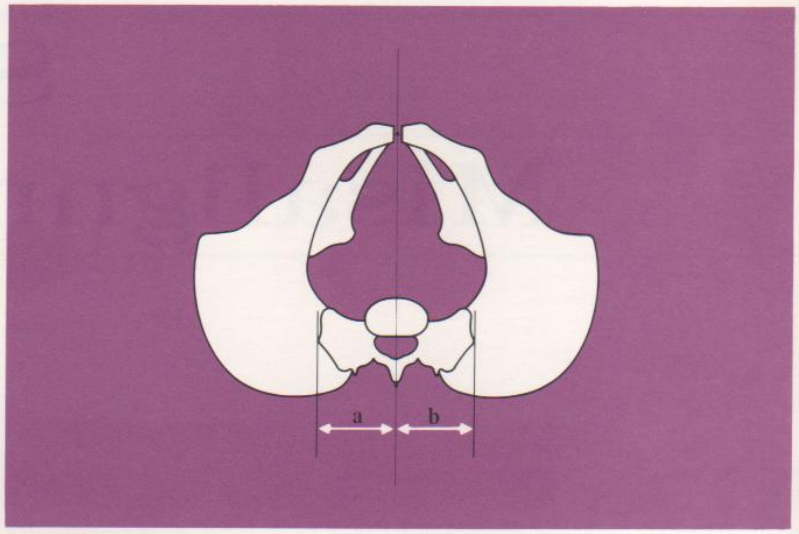


Figure 68: *The Normal Pelvis, Seen From Above.*

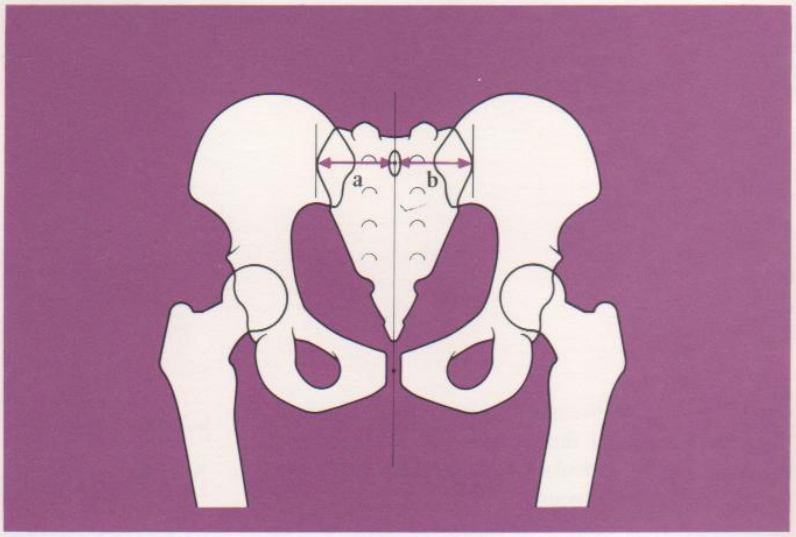


Figure 69: *The Normal Pelvis, Seen From Behind.*

but the sacrum rotates posteriorly away from the corresponding ilium on one side. This misalignment *also* involves the sacroiliac articulation, but it is principally a unilateral condition.

Figure 68 illustrates a normal pelvis seen from above. There is proper alignment between the sacrum and both ilia, thus the ilia show no misalignment. The same pelvis seen from behind would appear as in figure 69. If the distances from the center of the sacrum to its left and right lateral borders were measured, they would be found to be equal (lines "a" and "b", figures 68 and 69).

Figure 70 illustrates a pelvis seen from above in which the sacrum has rotated posteriorly away from the left ilium, as indicated by the arrow on the left sacral ala. This increases the length of line "a′", as compared to line "b′". Due to the loss of alignment at the left sacroiliac articulation, some degree of misalignment is also found in the ilia.

When viewed from behind, the sacral rotation is evidenced as unequal distance from the center of the sacrum to its lateral borders, the posteriorly rotated

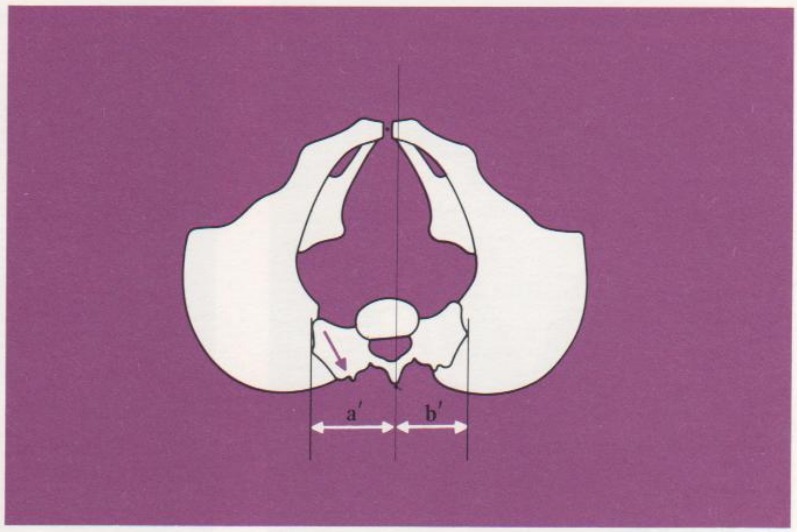


Figure 70: *Posteriorly Rotated Sacrum on the Left, Seen From Above.*

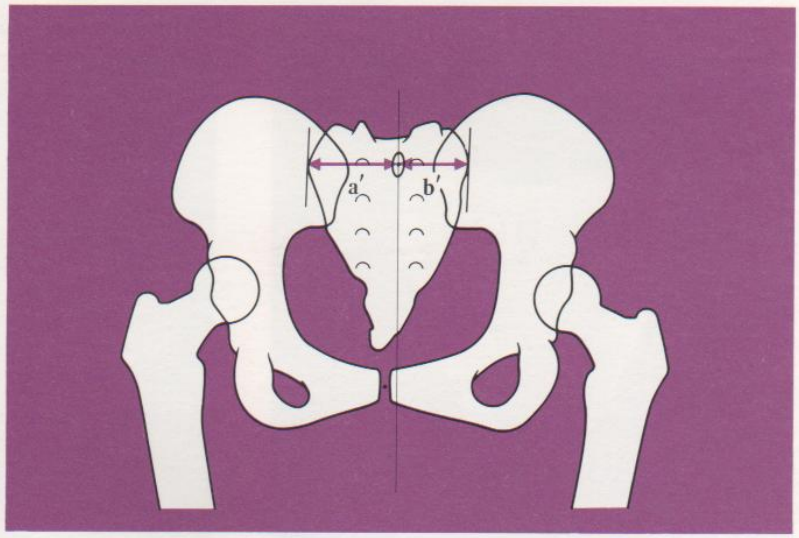


Figure 71: *Posteriorly Rotated Sacrum on the Left, Seen From Behind.*

side becoming wider (lines "a′" and "b′", figure 71). When projected on the film, the center of the sacrum, represented by the sacral tubercles, is displaced away from the border of the rotated side. The relatively slight amount of ilium misalignment is also seen in this view.

The sacral misalignment shown in figures 70 and 71 is designated as a *Posterior Sacrum on the Left*, and the listing is written *P–L*. The sacrum rotated similarly away from the right ilium would be a *Posterior Sacrum on the Right*, with the listing written *P–R*.

Horizontal Plane Line of Sacrum

When the sacrum and the ilia are properly aligned, a line representing the horizontal plane of the sacrum will normally be parallel with the femur head line. This is illustrated in figure 72. The line representing the horizontal plane of the sacrum is drawn from equal points on either side of the sacrum, the most reliable being the junction where the superior articu-

Figure 72: *The Horizontal Plane Line of the Sacrum.*

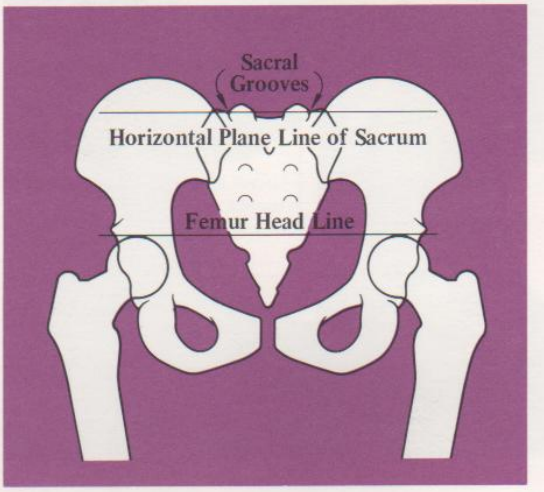
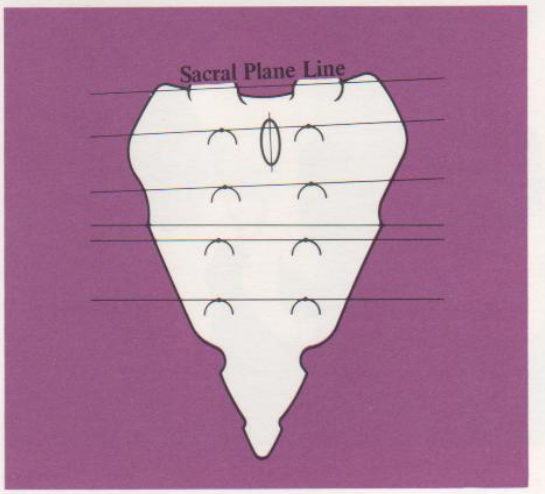


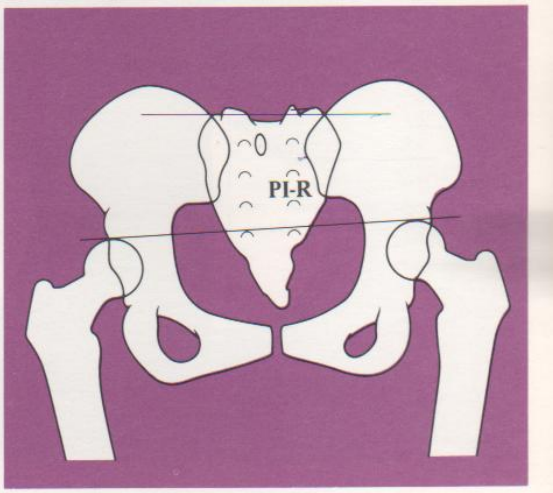
Figure 73: *Malformed Sacrum with Lines Through Like Points.*



lar processes join the alae. These points are named the *sacral grooves*, and the line is called the *horizontal plane line of the sacrum*.

If this line is not parallel with the femur head line, then malformation of the sacrum is the likely cause. Other bilateral points, such as the superior and inferior borders of the auricular surfaces and the sacral foramina, may be used to confirm malformation. Lines drawn through these like points would be parallel if the sacrum was uniform on both sides (Fig. 73).

Figure 74: *Posterior and Inferior Sacrum on the Right.*



If malformation is ruled out after careful scrutiny, then an inferior tipping of the sacrum on one side should be considered. This would only occur on the side of the posterior rotation. The misalignment would be designated as a *Posterior and Inferior Sacrum on the Right (PI–R)* or a *Posterior and Inferior Sacrum on the Left (PI–L)*.

An example of a PI–R sacrum is shown in figure 74. Not only has the sacrum rotated posteriorly on the right side, but it has also slipped inferiorward at the sacroiliac joint on that side.

The four potential sacral misalignments involving the sacroiliac articulation are as follows:

1. Posterior Sacrum on the Right (P–R).
2. Posterior Sacrum on the Left (P–L).
3. Posterior and Inferior Sacrum on the Right (PI–R).
4. Posterior and Inferior Sacrum on the Left (PI–L).

Measurement of Sacral Misalignment at Sacroiliac Joint

The A–P film is used to measure sacral misalignments at the sacroiliac joint. The procedure is shown in the following steps:

Figure 75: *Dots at the Sacral Grooves.*

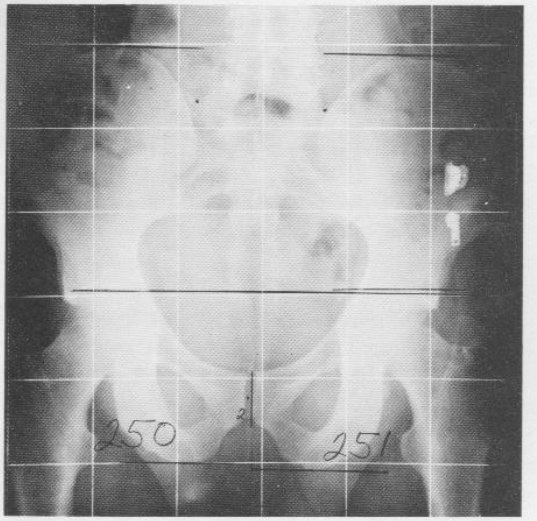


Figure 76: *The Horizontal Plane Line of the Sacrum.*

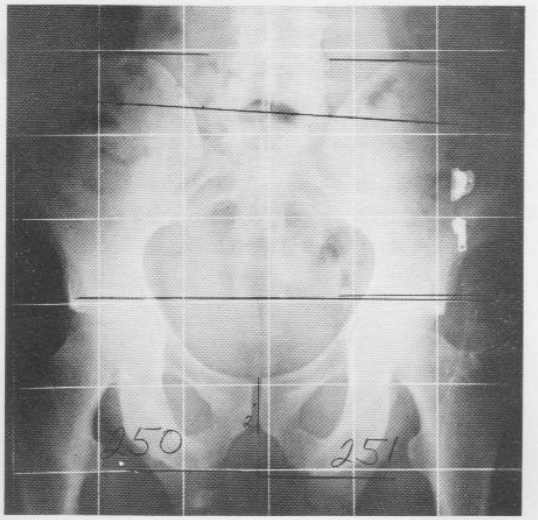


Figure 77: *Dots at the Sacral Borders.*

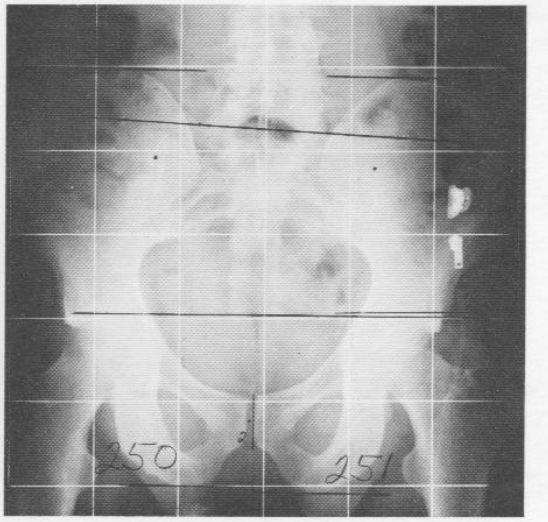
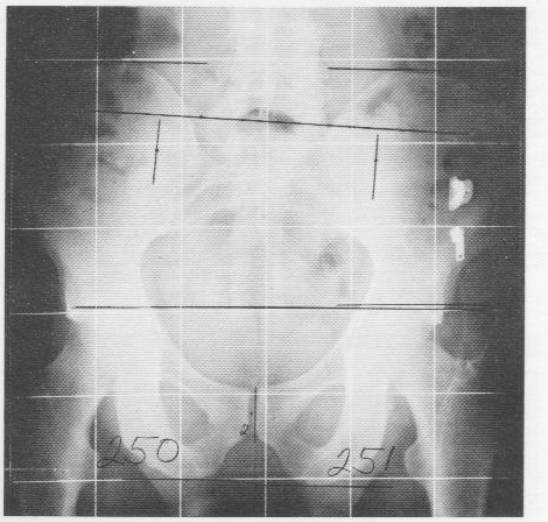


Figure 78: *The Sacral Lateral Borders.*



1. Place dots at the left and right sacral grooves (junction of articular process and ala) as shown in figure 75.

2. Draw a line through the dots, the full length of the parallel (Fig. 76). This is the horizontal plane line of the sacrum, which would normally be parallel with the femur head line.

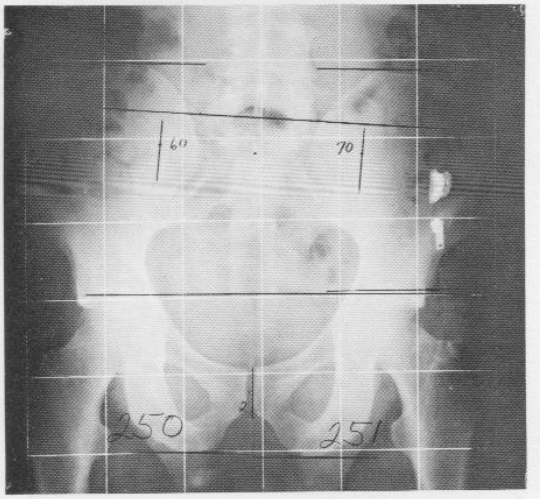
3. Place dots at the lateralmost borders of the sacrum, as in figure 77.

4. Place the parallel so the leading edge is perpendicular to the horizontal plane line of the sacrum. Slide the parallel along this line, stopping the leading edge at the dots placed at the sacral borders. Draw two-inch lines through each dot (Fig. 78).

5. Place a dot at the center of the first sacral tubercle.

6. Measure the distances from the center of the sacrum to the lateral borders. This is easily done

Figure 79: *The Lateral Distances Marked.*



using the scale on the parallel which is marked to 80 millimeters, left and right, from the center zero line. Place the zero line of this scale over the dot on the sacral tubercle, keeping the leading edge parallel to the sacral horizontal plane line. Read the two distances where the sacral border lines intersect the scale, and place them on the film as shown in figure 79.

The amount of difference in the two distances indicates the extent of posterior sacral rotation. *Any sum over seven millimeters should be considered significant*. (However, if the distances differ from four to six millimeters, and there are *no* misalignment factors in the ilia, the sacrum may still be considered posteriorly rotated. Two more qualifications are necessary here, before the sacrum is regarded as rotated: The bodies of all vertebrae above, *including axis*, must be rotated to the side of the posterior sacrum, and there must be *no scolioses* involved.)

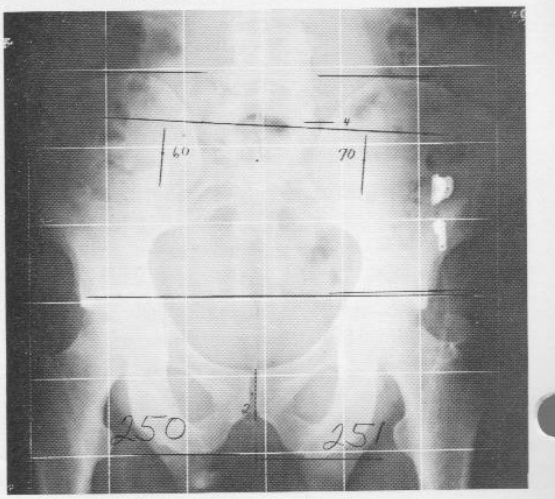
Measuring for Sacral Inferiority

Before listing the sacrum on the film, we must check for sacral inferiority. Any apparent inferiority must be verified by ruling out malformation. The procedure follows:

1. Align the parallel with the femur head line. Roll it superiorward until it touches the higher dot of the two previously placed at the sacral grooves. (If the leading edge touches both dots simultaneously, the horizontal plane line of the sacrum is parallel to the femur head line, and there is no sacral inferiority.) With the leading edge on the higher dot, draw a one-inch line above the lower dot. Measure the distance between this line and the sacral plane line, and mark the amount in millimeters as shown in figure 80.
2. If the lower side of the sacrum coincides with the side of posterior rotation, look for sacral malformation to account for the difference in height. In other words, the sacrum may appear to have slipped down on the side of rotation, when in reality the apparent inferiority is due to underdevelopment of the bone on one side. Check for this by putting dots on the film over bilateral structures that would normally be parallel with the horizontal plane line. Then run the parallel down from the plane line to see how the structures compare. The leading edge should touch both dots on either side at the same time if sacral symmetry exists. If the structures are evenly formed on both sides, and no malformation is found to account for the sacral incline, then inferiority may be added to the listing.

In figure 81 the right lateral distance measures ten millimeters wider than the left. There is an incline on the sacrum of 4 millimeters over the right sacral groove. However, the four millimeters of apparent inferiority can be accounted for in malformation, and is therefore not included in the listing. The sacrum is listed P_{10}–R.

Figure 80: *Apparent Sacral Inferiority–Four Millimeters.*



Rules for Correction

It was stated earlier that when the sacrum is rotated posteriorly on one side, the ilia remain relatively intact with respect to each other. Sometimes, in fact, there will be no misalignment factors on the ilia at all. If this is the case, the sacral posteriority is corrected by adjusting the rotated side forward to establish proper relationship at the involved sacroiliac joint.

In most cases, though, some amount of ilium misalignment also exists. When the proper relationship between the posteriorly rotated sacrum and the involved ilium is re-established, the ilia misalignment will also have been corrected.

But the posteriorly rotated sacrum cannot always be adjusted anteriorward to establish its contiguity with the ilium. This is true when the ilium of the involved side has misaligned predominantly posteriorward (PIEx, PI or Ex ilium). Adjusting the sacrum forward in this instance could increase the degree of ilium posteriority. Instead of adjusting the sacrum to the ilium, the ilium must be repositioned to align with the sacrum.

Which to Adjust?

When a posteriorly rotated sacrum is found to exist, and the listing of the ilium on the involved side is established, the doctor may turn to the following rules to determine which should be adjusted:

Adjusting Sacrum to Ilium

1. *If the ilium listing is AS, In, or ASIn, adjust the sacrum to the ilium.*
2. *If the listing is ASEx, with the AS predominating, adjust the sacrum to the ilium.*
3. *If the listing is PIIn, with the In predominating, adjust the sacrum to the ilium.*

Adjusting Ilium to Sacrum

1. *If the ilium listing is PI, Ex, or PIEx, adjust the ilium to the sacrum.*
2. *If the ilium listing is PIIn, with the PI predominating, adjust the ilium to the sacrum.*
3. *If the ilium listing is ASEx, with the Ex predominating, adjust the ilium to the sacrum.*

Figures 82 and 83 show examples of posteriorly rotated sacrum, one accompanied with an ASIn ilium, and the other with a PIEx ilium. In figure 82, adjusting the sacrum would be indicated, whereas in figure 83, the ilium should be adjusted to the sacrum.

Figure 81: *The P_{10}–R Sacrum, with Dots Confirming Malformation.*

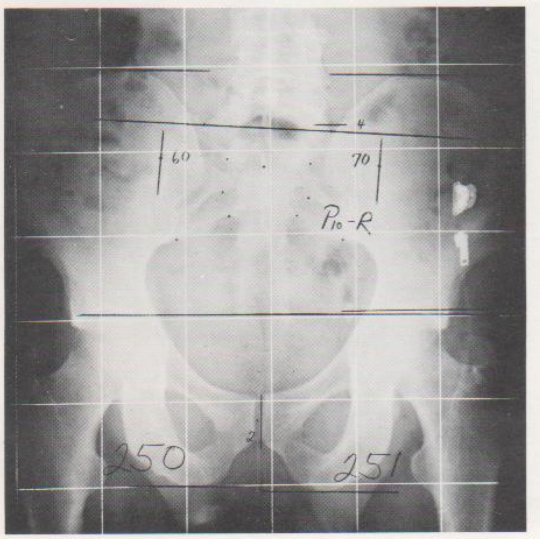


Figure 82: *Posteriorly Rotated Sacrum with ASIn Ilium–Adjust the Sacrum.*

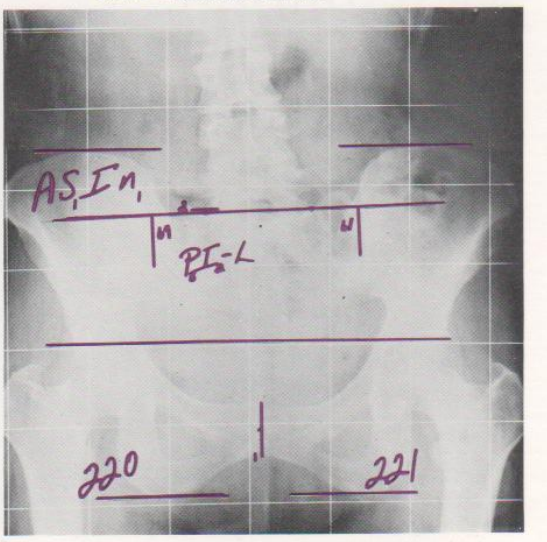


Figure 83: *Posteriorly Rotated Sacrum with PIEx Ilium—Adjust the Ilium.*

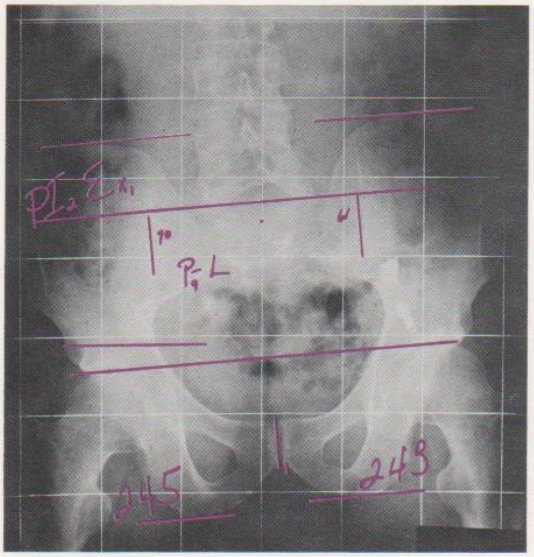


Figure 84: *Normal Relationship Between Sacrum and Fifth Lumbar.*

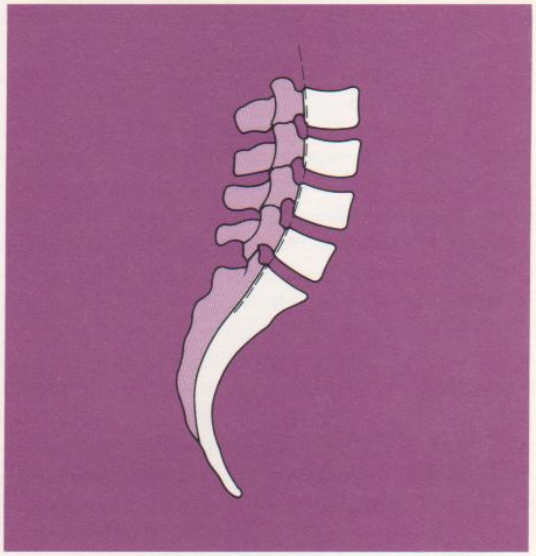


Figure 85: *The Posterior Sacral Base.*

Sacral Misalignment at the Lumbosacral Articulation

The Posterior Sacral Base

The posterior margins of the bodies of the fifth lumbar vertebra and the sacrum normally form an even, arcuate line. Any deviation from this would be evident from a lateral film.

Severe trauma to the pelvis, usually from a hard fall on the buttocks, may cause the sacrum to be driven posteriorward at the base. When viewed from the lateral film, the posterior margin of the body of the sacrum would rest behind that of the body of fifth lumbar. Such a misalignment of the sacrum involves only the lumbosacral articulation, and is designated as a *Posterior Sacral Base*. Any coexisting sacroiliac problem is regarded, and corrected, separately.

Figure 84 illustrates a normal relationship between the fifth lumbar and the sacrum. The bodies are in alignment along an arcuate line (dotted). In figure 85, the evenness of the line is interrupted by the posteriorward displacement of the sacral base.

Sacral Articular Processes Fracture

Particularly susceptible to incurring a posterior sacral base is the preadolescent whose sacral articular processes have not yet ossified sufficiently to withstand a severe blow. The processes fracture forward into a permanently bent position.

Not a Spondylolisthesis

A distinction is made here between a posterior sacral base and a fifth lumbar spondylolisthesis.

When the sacral base misaligns posteriorward, it is the sacral articular processes that have given way. The vertebral arch of the fifth lumbar is still intact, and the bodies of the above vertebrae are still in line. It is

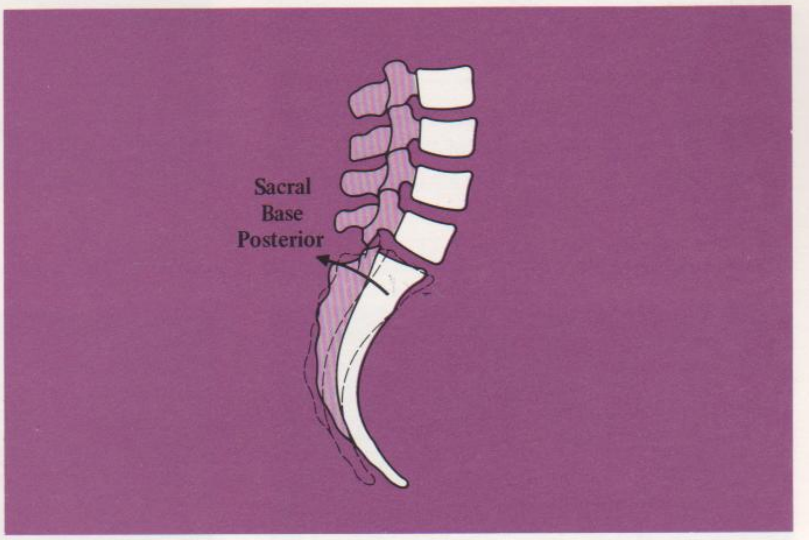


Figure 86: *Posterior Sacral Base – Lumbar Bodies In Line.*

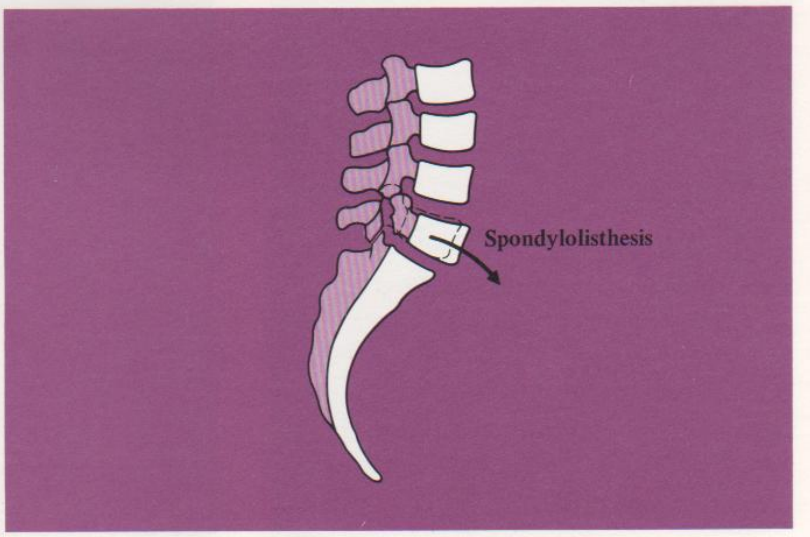


Figure 87: *Spondylolisthesis– Lumbar Body Slips Anteriorward.*

the sacrum that has been driven out of alignment posteriorward.

In the spondylosisthesis of fifth lumbar, however, there is a separation defect in the vertebral arch which allows the body of the fifth lumbar to slip forward of the sacrum. It will usually also go forward of the fourth lumbar body, although to a lesser degree. Figures 86 and 87 compare the posterior sacral base and the spondylolisthesis of fifth lumbar. The dotted lines represent the normal position of the part before it misaligned.

Determining the Posterior Sacral Base

The lateral film is used for determining posteriority of the sacral base. The margins of the bodies of the fifth lumbar and the sacrum may be measured visual-

Figure 88: *Lines along Bodies Showing Posterior Sacral Base.*

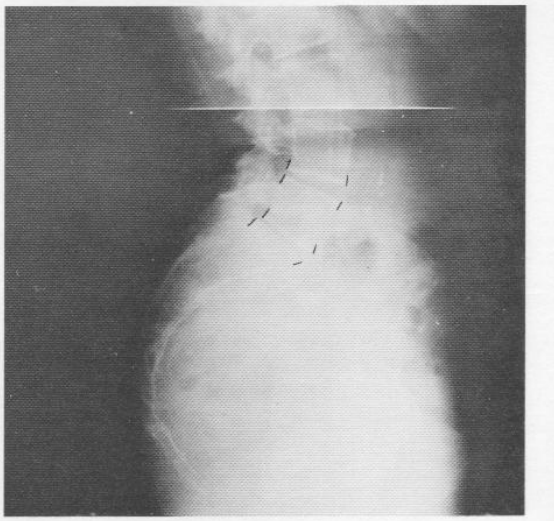


Figure 89: *Posterior Sacral Base with Bodies in Line.*

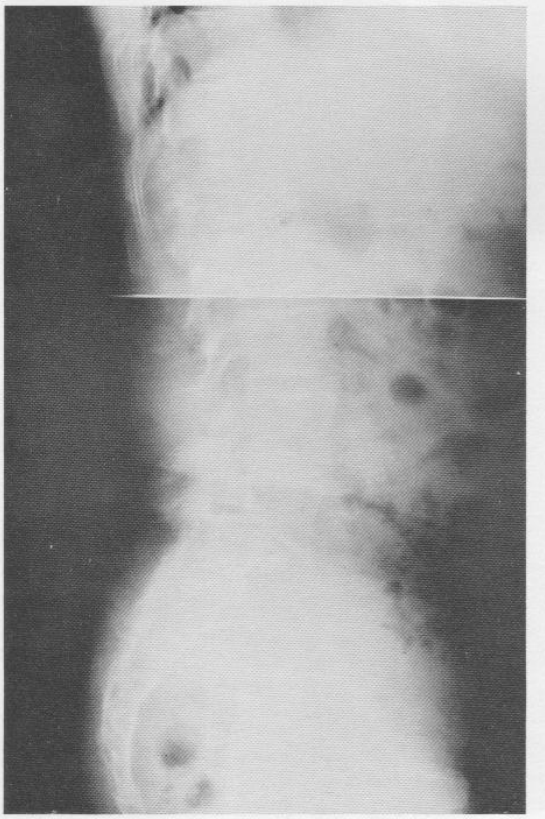
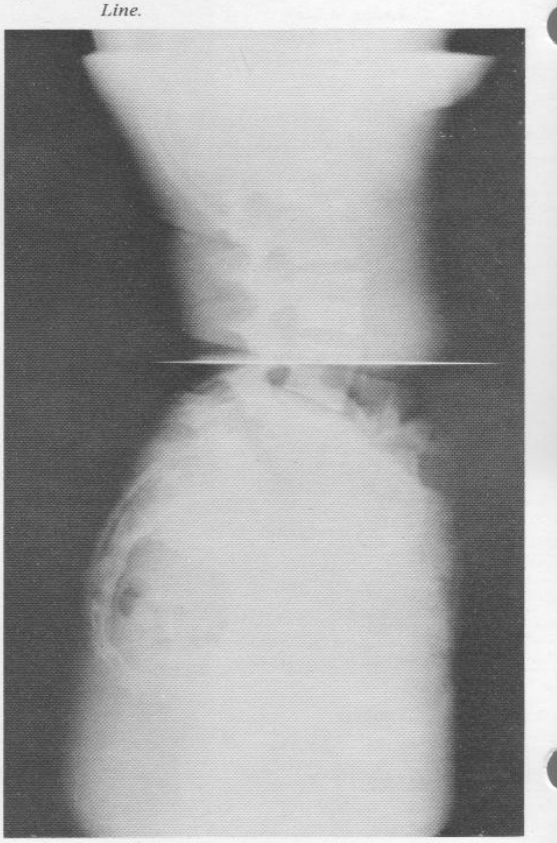


Figure 90: *Posterior Sacral Base with Bodies in Line.*



ly for posteriority, or lines may be drawn along the anterior and posterior borders as shown in figure 88, to compare the positioning of the bodies.

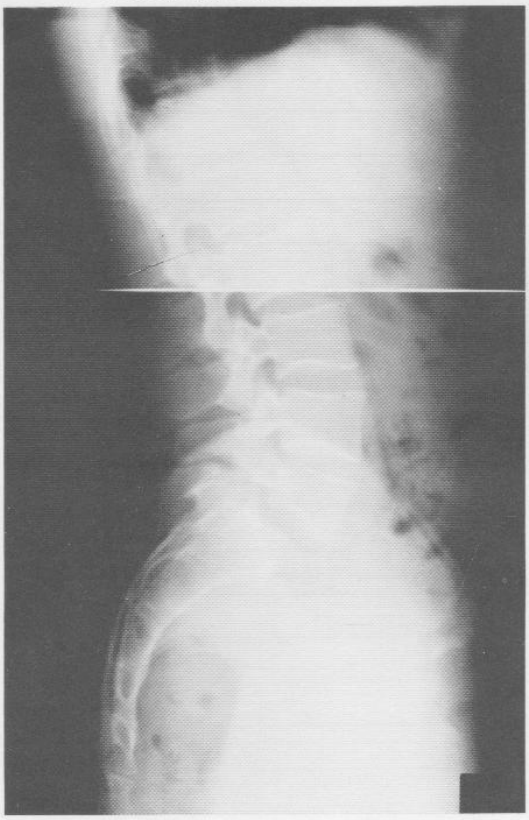
Which to Adjust?

In order to re-establish the normal alignment between the posterior sacral base and the fifth lumbar, the sacrum is adjusted up to the lumbar. In the case with spondylolisthesis, the sacrum is also adjusted to the fifth lumbar, although total realignment is rarely accomplished. Adjusting the fourth lumbar is *never* indicated when there is spondylolisthesis of the fifth lumbar, for the risk of increasing the lumbosacral misalignment is too great.

Again it must be emphasized that adjustments are not made based on misalignment alone, but that evidence of subluxation must also exist.

Figures 89 through 92 show examples of posterior sacral base and spondylolisthesis.

Figure 91: *Spondylolisthesis–Fifth Lumbar Ahead of Sacrum and Fourth Lumbar.*

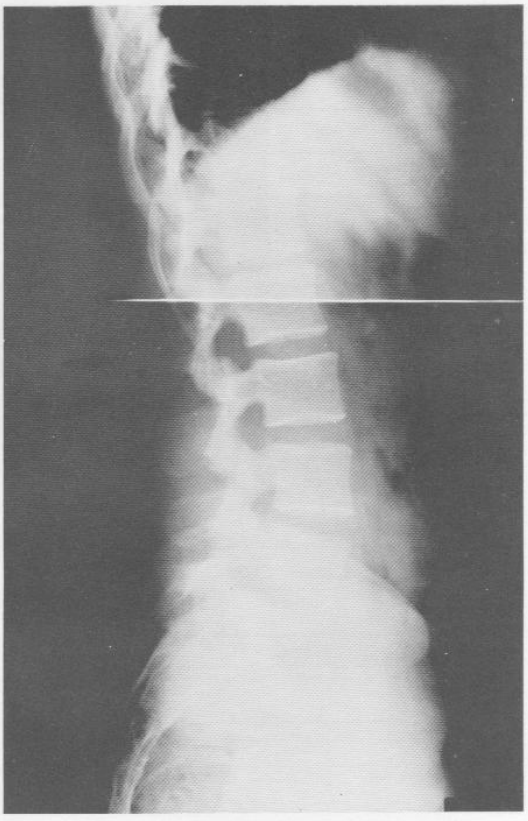


Misalignment of the Coccyx

Because of its location at the apex of the sacrum, the coccyx is especially subject to trauma. The direction of misalignment is usually straight anterior, but accompanying lateral deviation may also occur. The anterior misalignment is seen on the lateral film. On a clear A–P film, lateral deviation may be sometimes found. The coccygeal listings are as follows:

1. Anterior (A).
2. Anterior and Right (A–R).
3. Anterior and Left (A–L).

Figure 92: *Spondylolisthesis–Slight but Actual. Notice Separation in Arch.*



Figures 93 and 94 show examples of coccygeal misalignment.

Figure 93: *Anterior Coccyx.*

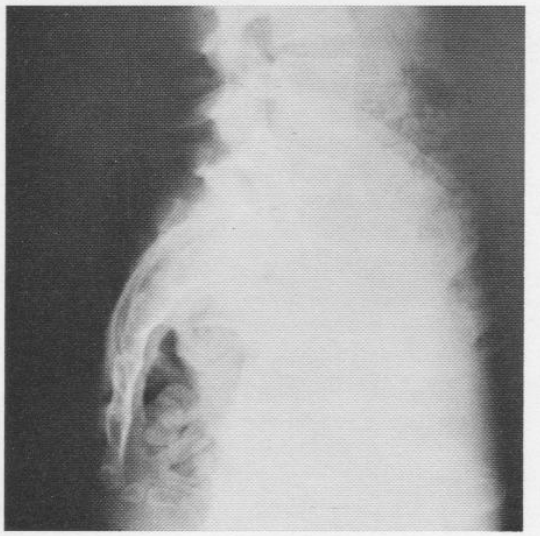
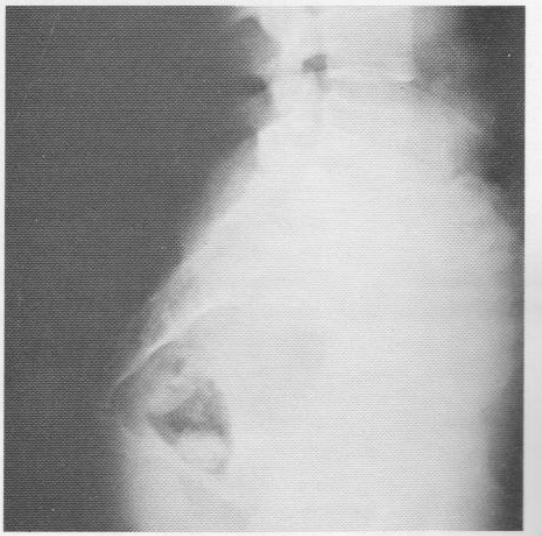


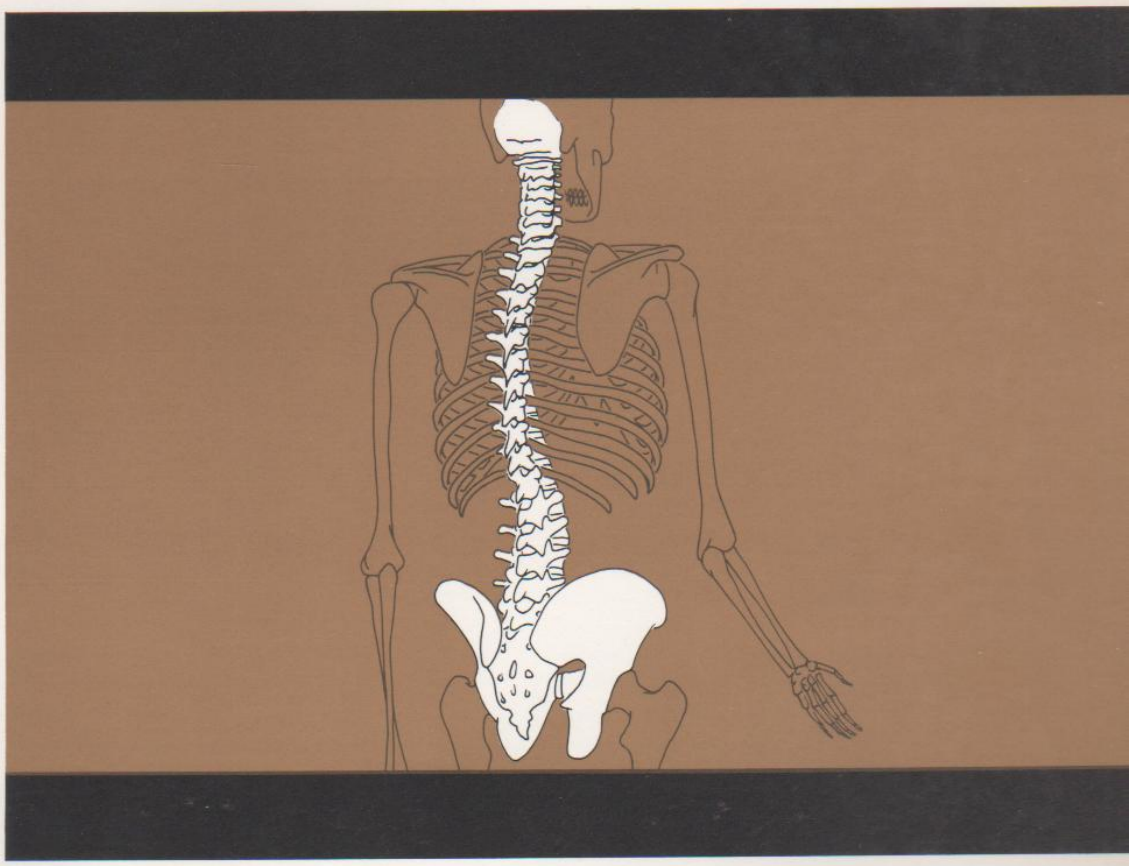
Figure 94: *Anterior Coccyx.*



Notes

The Mechanism of Vertebral Subluxation

Chapter 5



Gonstead Chiropractic Science & Healing Art

Chapter 5

The Mechanism of Vertebral Subluxation

The causal relationship between dysfunction of the nervous system and disease is basic to chiropractic. It is also fundamental that some aberration within the spinal column produces the nerve dysfunction; more specifically, that a malpositioned vertebra is at fault.

Ascertaining which vertebra is causative is the most crucial question the chiropractor must resolve. He must determine exactly what is producing the patient's problem before he can hope to correct it.

Since the advent of the roentgenogram in chiropractic practice, the film has been used almost exclusively to decide which vertebra is producing nerve pressure. The corrective approach has been to analyze the film for the vertebra most misaligned, and "adjust" the "subluxation".

A satisfactory film analysis method for finding the offending vertebra has eluded the practitioner, for such an approach has brought only occasional results. In fact, the incidence of correction has been so irregular that the very principles of chiropractic have been repudiated and degraded in the minds of many chiropractors.

The film does disclose misaligned vertebrae. But nerve dysfunction results from more than misalignment. Subluxation involves physiological and pathological conditions concomitant with misalignment.

The mechanism of subluxation must be thoroughly understood by the chiropractor. He cannot be content with the hazy notion that a subluxation is "a vertebra out of juxtaposition . . . and impinging a nerve".

Whereas future chapters will reveal *how* to find subluxations, this chapter explains the mechanics of the vertebral subluxation, and shows why, even in the final analysis, the subluxation cannot be determined from the film.

The Intervertebral Disc

The vertebral column is to the spinal cord what the skull is to the brain; namely, an osseous housing for protection of its delicate neural contents. In addition, the spine serves to support the head and trunk, and stabilize the body as a whole.

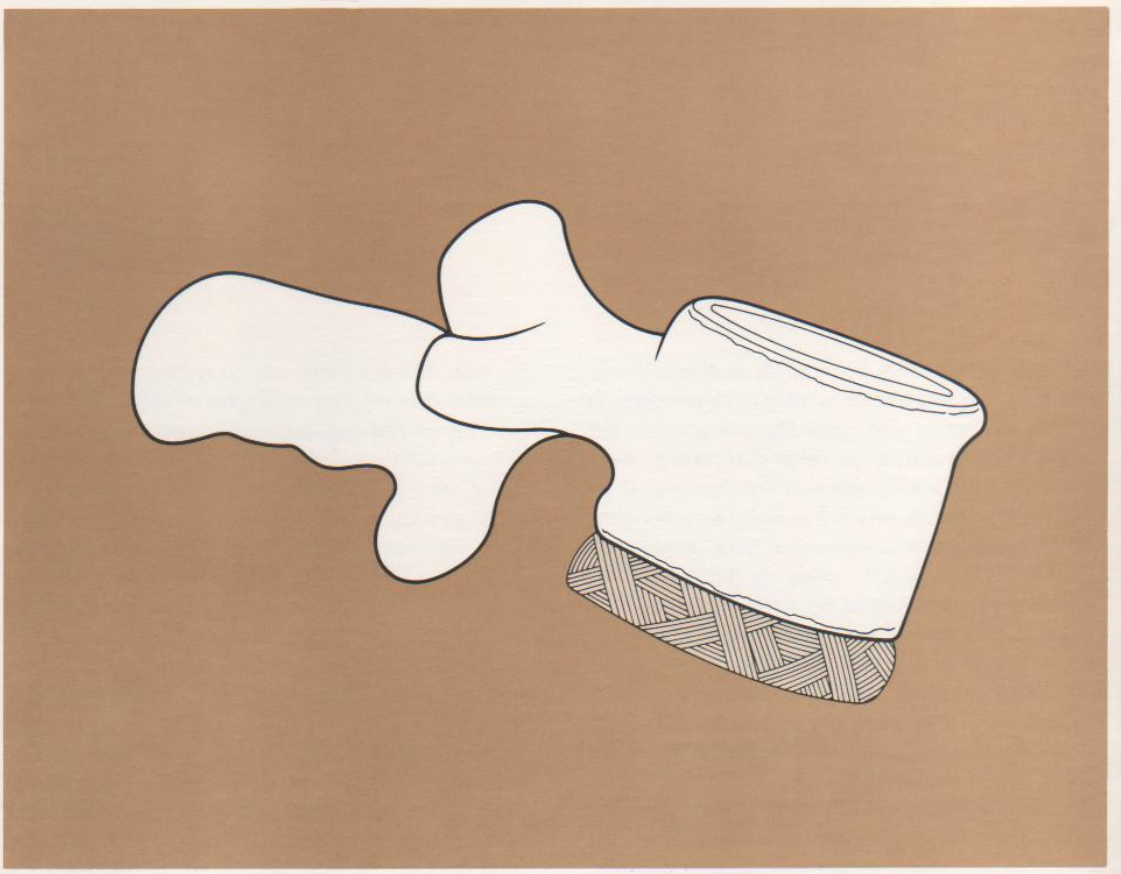
The two main functions, protection and support, might better be provided if the spine were a solid column of bone, even while allowing for the transmission of nerves through neural foramina. But if this were the case, the rigidity would be very restricting.

Flexibility is afforded the spine through its segmentation into twenty-four vertebral units. This is accomplished not without some sacrifice of both protection and support, although the loss of stability is minimized through the use of strong restraining ligaments. The most important of these ligaments are the *intervertebral discs*.

The intervertebral discs are pads of fibroelastic cartilage located between, and strongly adherent to, the bodies of adjacent vertebrae. Although these interbody joints are symphysis articulations, and they singly allow only slight, amphiarthrodial movement, the cumulative effect permits considerable motion to the total spine. Of the twenty-four movable segments in the spine, twenty-three consecutive segments are provided with discs, the atlas being the sole exception.

When speaking about the disc of a particular vertebra, we are referring to the disc upon which the body of that vertebra sits. In other words, *the disc of a vertebra is the one inferior to its body* (Fig. 95).

Figure 95: *A Vertebra and its Disc.*



The most important purpose of the discs is to provide flexibility to the spine while at the same time maintaining the adjacent vertebrae within allowable limits of displacement. How well they function in this capacity depends upon the integrity of their anatomical components.

In the approximate center of the disc is the semigelatinous *nucleus pulposus*. The nuclear substance is a colloidal gel with a great affinity for imbibing and holding fluids (Fig. 96).

Surrounding and encapsulating the nucleus are the semielastic fibers of the *annulus fibrosus*. They are formed as thin, concentric layers of tissue which adhere strongly to the cartilagenous plates of the two opposing vertebral bodies. The annulus serves as a flexible, closed container for the nucleus (Fig. 96).

The body of the vertebra normally sits on top of the disc with the nucleus in the center. As the vertebra moves during motion of the spine, as with flexion, extension, rotation and lateral flexion, the vertebral body rocks back and forth, and rotates, upon the nucleus. In this sense, the nucleus functions as a pivotal ball bearing (Fig. 97).

As long as the annulus fibers are intact, so that the nucleus remains spheroid and encapsulated in the center of the disc, the vertebral bodies will be able to retain their proper relationships.

Figure 96: *The Intervertebral Disc, Showing the Nucleus Pulposus and the Annulus Fibrosus.*

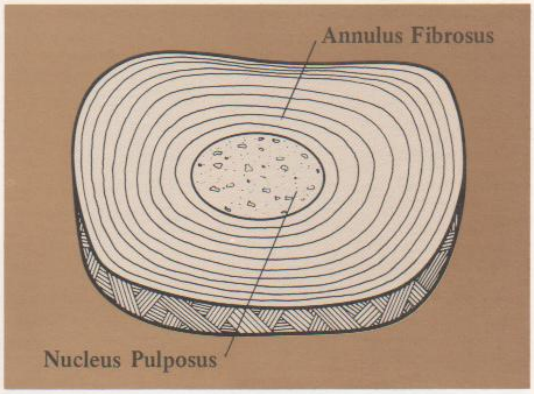
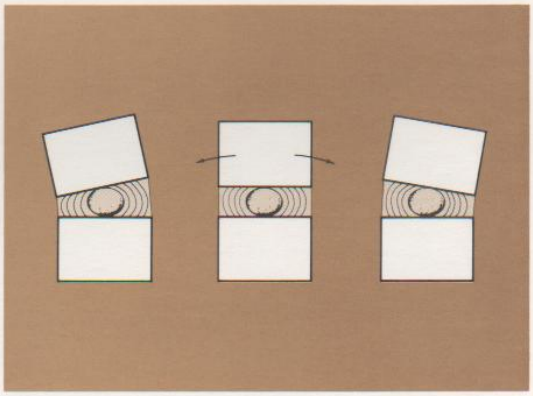


Figure 97: *The Nucleus Functions as a Pivotal Ball Bearing.*



Optimal Relationship

In the static spine, the anatomically and physiologically normal discs will allow the vertebral bodies to resume their *optimal relationships*. The optimal relationship between two vertebrae is found when the perimeters of the bodies are in line, and the vertical distance between the opposing surfaces of the vertebral bodies is the same at all points (Fig. 98). In such a relationship there will be no wedging of the discs between the vertebral bodies, and the vertebrae will have what are referred to as *parallel discs.*

A vertebra may be considered misaligned if it presents anything other than this optimal relationship when the spine is static and the subject is in the erect standing position. Figure 99 shows A-P and lateral radiographs taken of a subject in the erect standing position. No misalignments are evident, as all the vertebrae are in their optimal positions and exhibiting parallel discs.

It has been suggested that wedged discs are normal, and that the difference in thickness at the anterior and posterior borders accounts for the primary and

Figure 98: *Vertebral Bodies in Optimal Relationship. Discs "Parallel" on A-P and Lateral Views.*

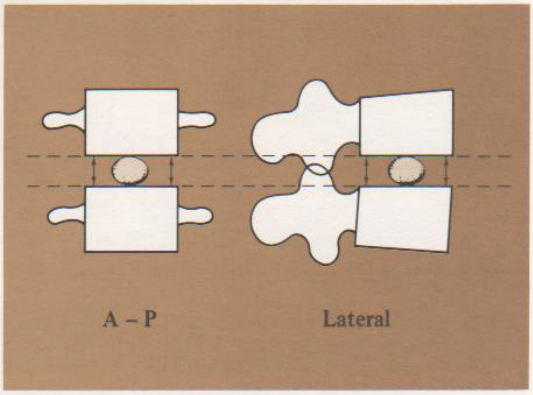
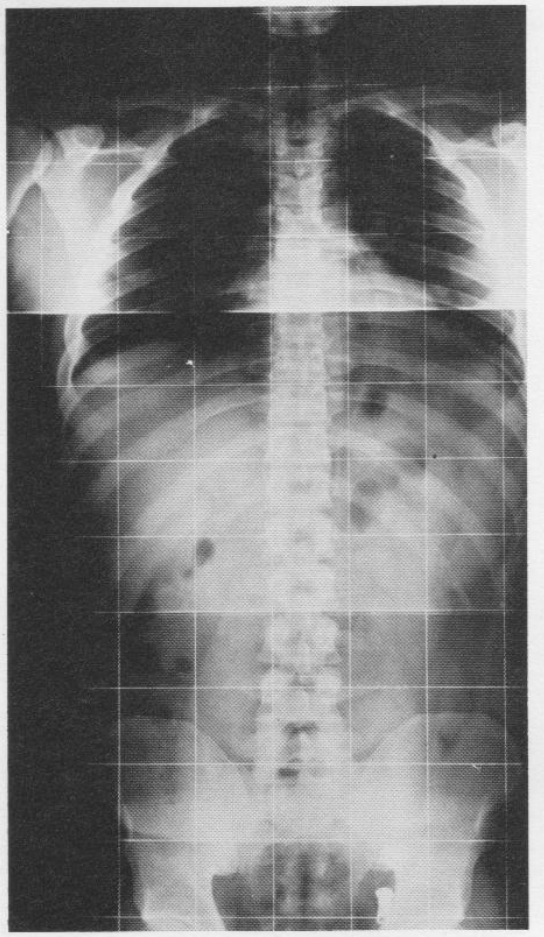
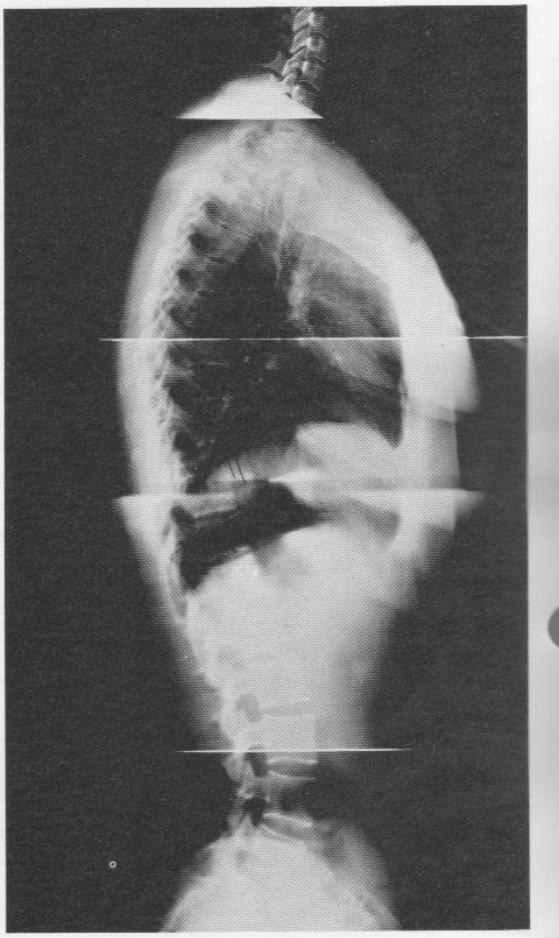


Figure 99: *A-P and Lateral Views Showing Parallel Disc Spaces and Normal Spinal Curves.*





secondary curves of normal posture. However, it is not necessary to have wedged discs in order to have normal spinal curves, as seen in figure 99. Many anatomy texts are now showing vertebrae with parallel discs, and indicate that the spinal curves are formed by the wedged shape of the vertebral bodies themselves.

Since it is rare that healthy people are radiographed, one would not expect to find many films showing all vertebrae with optimal relationships. Among the factors that alter the optimal relationships of vertebrae are abnormal weight distribution, congenital malformations, subluxations, and their effects. However, those vertebrae which do exhibit parallel discs on both the A-P and lateral radiographs are almost certain not to be subluxated.

Trauma Initiates Subluxation

If we assume that vertebrae with parallel discs are in alignment, and not subluxated, then we must identify what it is that causes them to misalign, and what happens when the segment subluxates. Trauma to the spine, either from the accumulative effects of repeated minor episodes, or from a single incident, damages the anatomical structures of the disc and initiates the sequence of events which result in nerve dysfunction. The process is described in the following steps:

1. Trauma misaligns the vertebra, shifting it into a sustained position.

2. The shifting vertebral body compresses the disc and exerts pressure on the nucleus. Since the nucleus has a high water content, and is noncompressible, it is forced against the annulus.
3. The annulus fibers are stretched beyond their elastic limit by the bulging nucleus, resulting in damaged or *deranged* fibers.
4. Tissue damage induces an inflammatory reaction. Intracellular edematous fluid infuses the disc, causing it to expand and protrude.
5. Protrusion of the disc produces compression upon neural structures within the neural canal, or in the intervertebral foramen.
6. The nerve pressure thereby produced results in nerve dysfunction.

Disorder of Disc

From the foregoing description, we can conclude that a subluxation is a disorder of the disc. Typically, vertebral subluxation has been regarded as a slight disrelationship, or an overriding ("less than a luxation"), of the posterior articular processes. However, these apophyseal joints are freely movable diarthrodial articulations, and are not in any way causative to the condition of subluxation. The disrelationship of the facets is the result of, and secondary to, the misalignment at the fibrocartilaginous joint; that is, at the intervertebral disc (Fig. 100).

A subluxation will almost always show a wedged disc on either the A-P or lateral projection, and usually on both. With the containing envelope of the nucleus no longer intact, the nucleus migrates toward the periphery. This tilts the vertebral body, raising it in the direction that the nucleus shifts, and dropping it in the opposite direction. It could be said that the nucleus moves toward the open side of the wedge.

An example of vertebral wedging due to the nucleus moving toward the right side and anteriorward is illustrated in figure 101.

When a vertebra misaligns on its disc, there is always some posteriority in the direction of misalignment, when compared with the vertebra below. As the body slips backwards, it presses the nucleus anteriorward. This allows the posterior portion of the vertebra to drop inferiorward. When projected on a lateral film, the posteriority of the vertebral body may seem negligible if compared with the posterior-superior margin of the body of the vertebra below.

However, when the normal parallel disc is visualized, or penciled in, it can clearly be seen that the posterior margin of the misaligned body has to be replaced superiorward and anteriorward in order to sit properly on its parallel disc (Fig. 102).

If the subluxation becomes chronic, fissures form through the consecutive layers of the annulus, allowing the nucleus to move further toward the periphery. As this progresses the disc becomes more and more wedged. Eventually, abnormal weight bearing and uneven wear cause a pressure atrophy, so that the entire thickness of the disc is diminished.

Unless correction of the vertebral subluxation intervenes, the disc usually progresses through worsening degrees of degeneration. These changes are

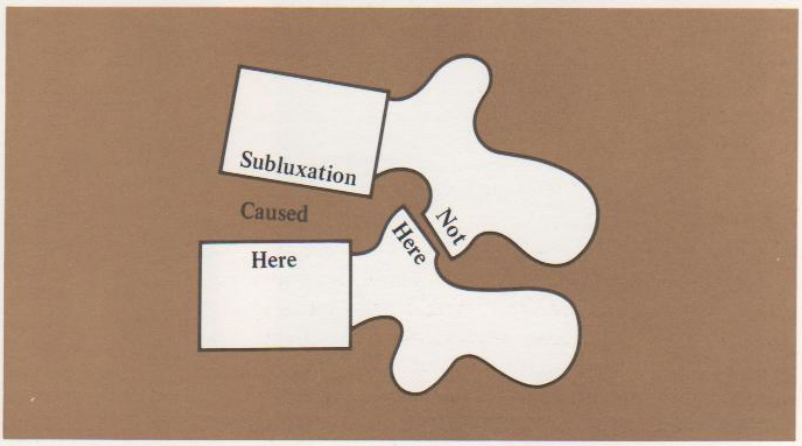
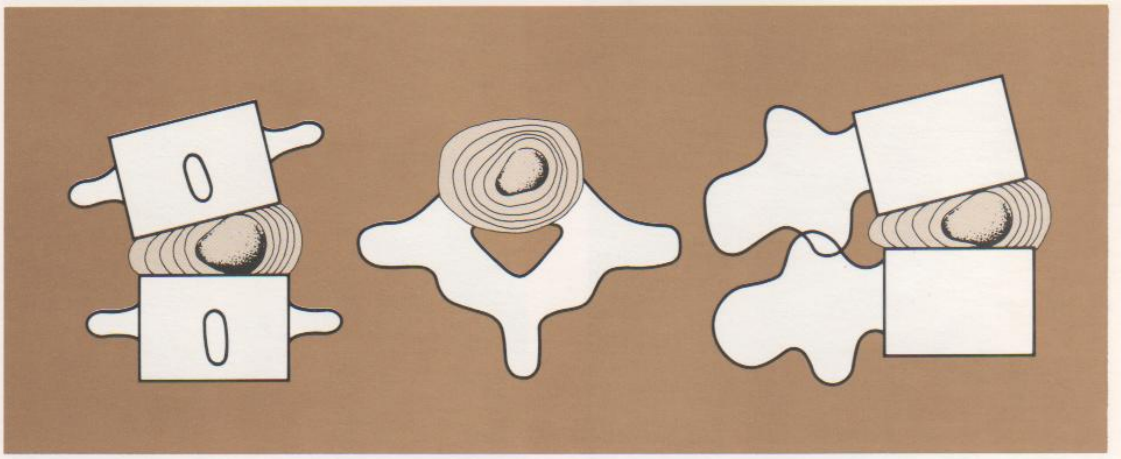


Figure 100: *Subluxation Occurs at the Fibrocartilagenous Joint, Not at the Apophyseal Joints.*

Figure 101: *The Nucleus Has Moved Toward the Right and Anteriorward, Wedging the Disc.*



plainly evidenced by analyzing the condition of the *disc space* from the lateral radiograph. The stages range from the acute disc, then pass into the early chronic states, and finally into the later destructive stages.

Stages of Disc Degeneration

A system for listing the condition of the discs has been devised which is helpful to the practitioner during correction. Six stages of disc degeneration are listed as follows:

D_1 – Swollen Disc

The entire disc is noticeably thickened and swollen from an acute injury. It is obviously thicker than the other discs in its area of the spine.

D_2 – Disc Thin at Posterior

The space at the posterior of the disc is diminished, with the vertebra just noticeably misaligned posteriorward and inferiorward. The disc condition has proceeded beyond the acute stage.

D_3 – Disc Very Thin at Posterior

The disc is extremely wedged, the body having misaligned very posteriorward and inferiorward. This is a chronic state.

D_4 – Total Disc is Thin

The total disc thickness is observably diminished, and may be reduced to about two-thirds of its original height. The vertebra is misaligned posteriorward and inferiorward. There is minimal damage to the vertebral body above the disc, with some evidence of arthritis or exostosis. This condition has become more chronic than above.

D_5 – Total Disc Very Thin

The total disc is decreased to about one-third of its original thickness. The body has misaligned very posteriorward and inferiorward. There is severe damage to the body of the vertebra above, and well advanced arthritis and exostosis. This is much more chronic and more difficult to correct.

D_6 – Total Disc Extremely Thin

The entire disc spacing is greatly diminished, being from two-thirds to totally reduced. The vertebra is extremely posterior and inferior. This is the most chronic, and the most difficult to correct.

Figures 103 through 108 show examples of the various stages of disc degeneration in lumbar vertebrae. The cervicals and thoracics exhibit the same degenerative changes.

Where Nerve Pressure Occurs

The disc protrusion is usually greatest on the open side of the wedge. The area offering least resistance to the protrusion is in the direction of the intervertebral foramen, since the anterior and posterior longitudinal ligaments somewhat restrain the bulging. For this

Figure 102: *The Vertebra has Misaligned Posteriorward and Inferiorward. To Sit Properly on the Disc, the Body Must Move Superiorward and Anteriorward.*

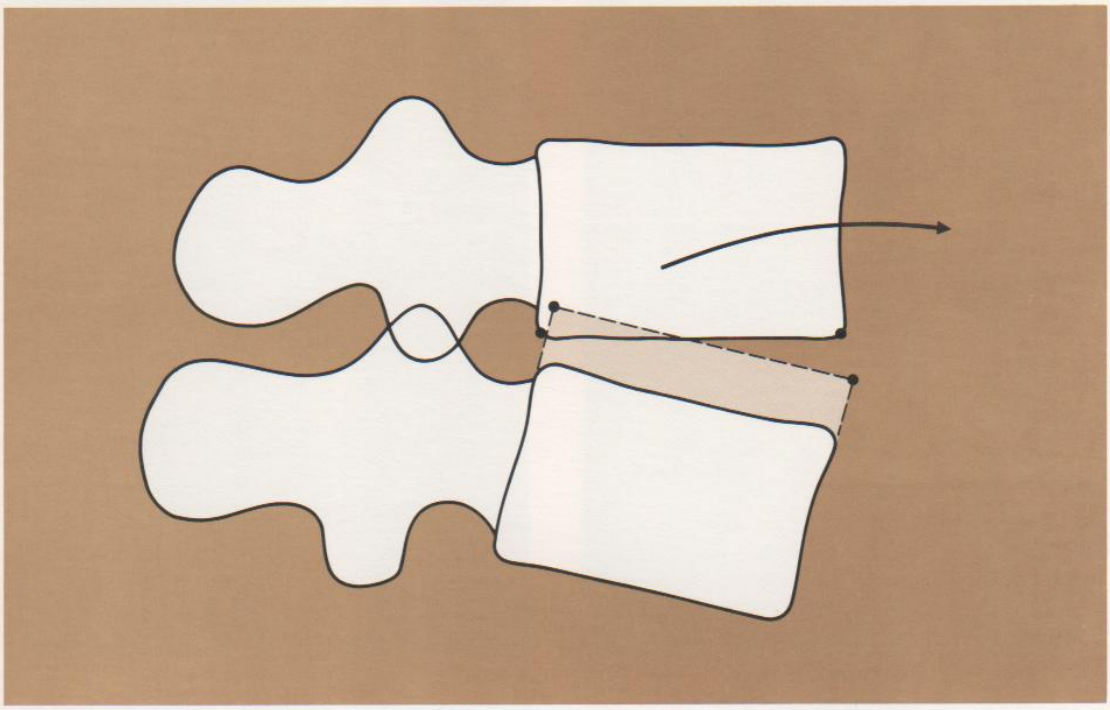


Figure 103: D_1 *Disc of 3rd Lumbar Vertebra.*

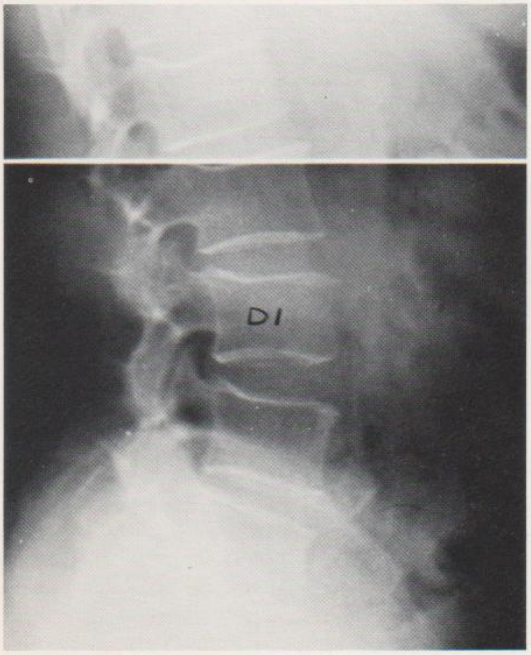


Figure 104: D_2 *Disc of 3rd Lumbar Vertebra.*

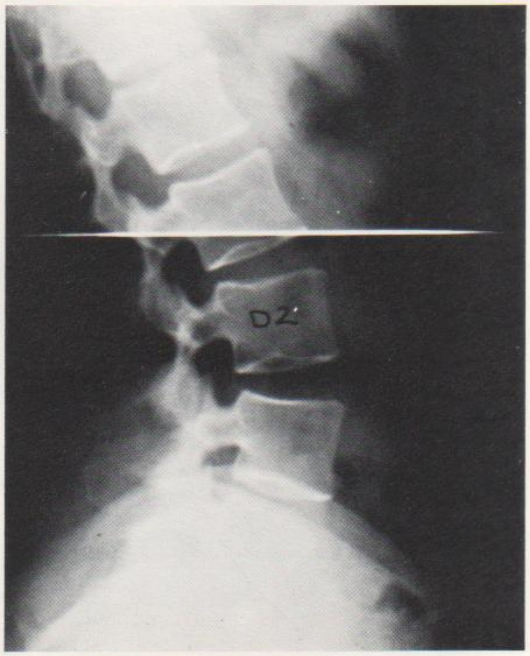


Figure 105: *D_3 Disc of 4th Lumbar Vertebra, Showing 5th Lumbar Sacralized.*

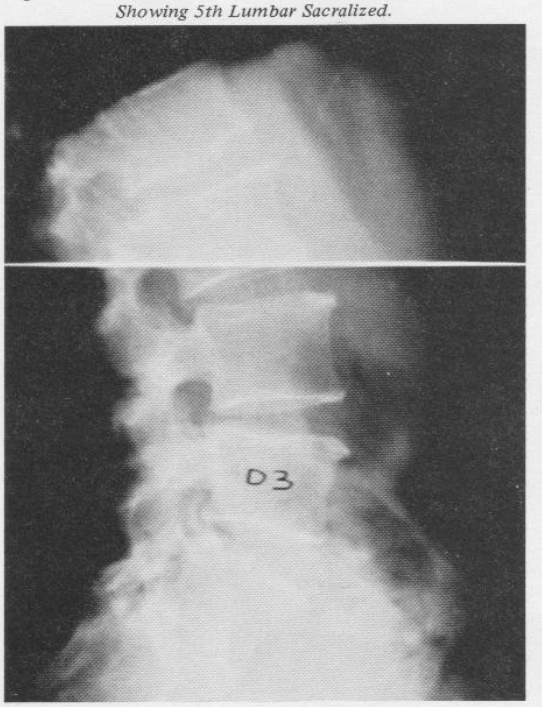


Figure 106: *D_4 Disc of 5th Lumbar Vertebra.*

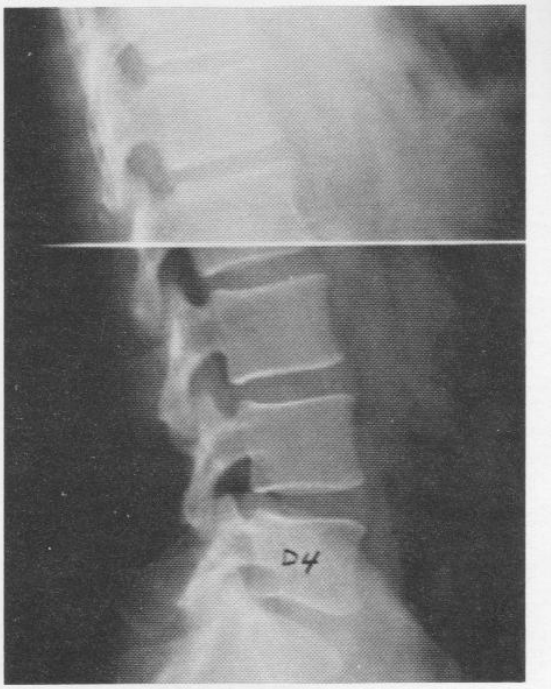


Figure 107: *D_5 Disc of 5th Lumbar Vertebra.*

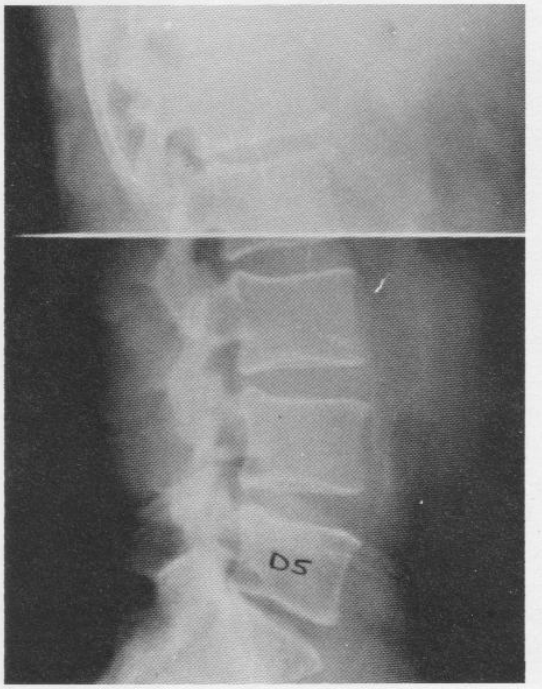
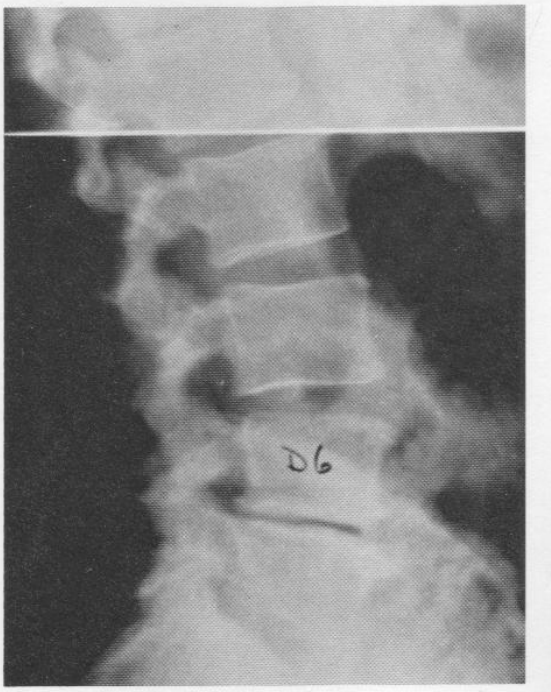


Figure 108: *D_6 Disc of 4th Lumbar Vertebra.*



reason the nerve pressure is nearly always on the wide side (Fig. 109). Sometimes, though, the protrusion is more posteriorward and compresses the spinal cord directly.

It should be emphasized that it is not the displaced nucleus that protrudes the disc, but the effects of edema resulting from the displaced nucleus.

Fixation

When a vertebra is subluxated, several factors are at work which reduce the motion of the vertebra on its disc.

Since the nucleus is displaced toward the periphery of the disc during subluxation, the pivotal action of the nucleus is lost. This alone greatly reduces the range of motion, especially toward the direction of the displaced nucleus. That is, if the nucleus moves laterally to the left, then lateral flexion to that side will be diminished for that particular vertebral segment.

In addition, the infiltration of the disc by edematous fluid reduces the vertebral motion. In this respect, the fluid may be regarded as a stabilizing mechanism, attempting to protect the injured joint from further misalignment. The disc becomes hardened and turgid from the intracellular edema.

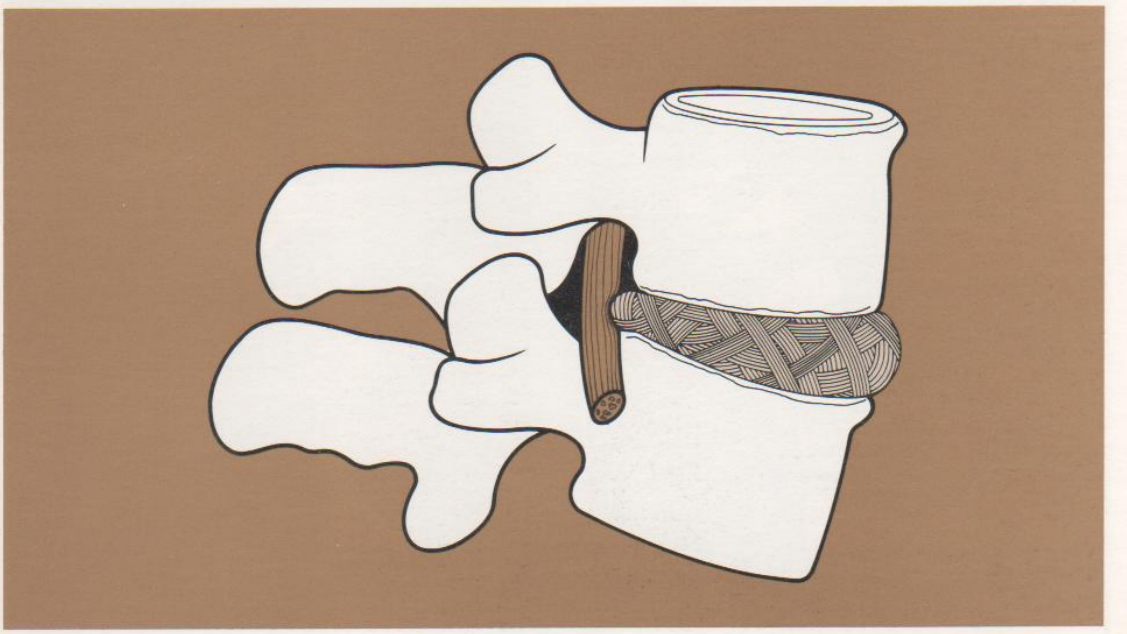
Another immobilizing factor is that of adhesions. Adhesions develop as the subluxation becomes more chronic. They may be described as areas of dehydrated and shrunken tissue which form ridges and grooves. These adhere together, reducing the motion of the vertebral body.

Every vertebra that is subluxated loses its normal motion. It is considered *fixed*, and the area of reduced mobility between the fixed vertebra and the subjacent vertebra is regarded as a *fixation*.

Hypermobility

Whenever a fixation exists in the spine, the motion normally contributed by that segment must be assumed by one or more other segments, if the same range of motion is to be maintained. If, for example, the cervical spine was laterally flexed through a range of sixty degrees, each of the vertebrae, C_2 through C_7, might hypothetically contribute ten degrees of the motion. With the fifth cervical fixed due to subluxation, however, its complement of ten degrees would have to be taken up by the other segments if

Figure 109: *The Nerve is Compressed on the Wide Side of the Wedge.*



the spine was still flexed through sixty degrees of motion. This is illustrated in figure 110.

Which segments take up the motion, and how much motion they assume, is determined by such factors as where in the spine the fixation occurs, the planes of the facets, and the condition of the discs of the other segments.

The vertebrae which exhibit greater movement because they are compensating for the loss of motion from a fixation are regarded as being *hypermobile*. One might expect to find areas of hypermobility both below and above a subluxation, and this has been dramatically demonstrated by cineradiography.

Compensation

An experience that baffles many practitioners is to retake a radiograph of a patient whose symptoms have persisted, and observe no change in the spine when comparing the "pre" and "post" films. Even though they have "adjusted" the spine often, and over a long period of time, there is no noticeable repositioning of any of the vertebrae. They wonder why, if vertebrae can be adjusted into different positions, this is not obvious on the film.

Another phenomenon many observe on the radiograph is to see a particular vertebra change its direction of misalignment as the patient's position is altered. The atlas, for example, may seem to have misaligned to the left of axis when the patient is standing, but when seated or lying supine, the atlas may be listed to the right of axis. They ask from which direction, if the misalignment is to be corrected, should the adjustment be made.

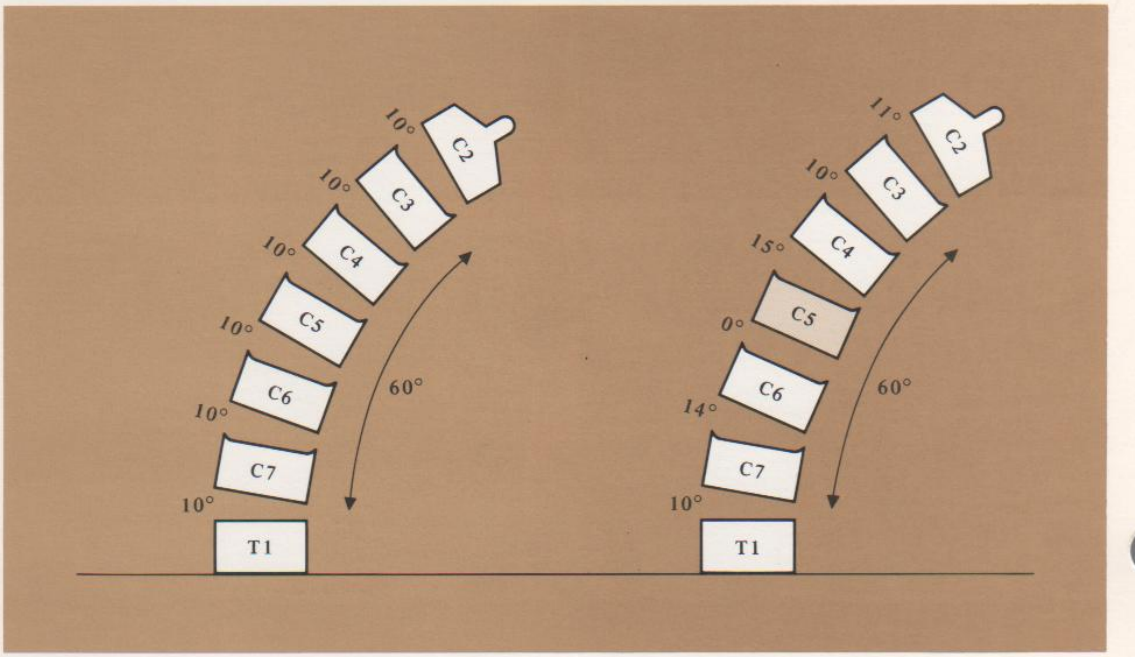
The answers to both these questions are revealed in the principle of compensation.

Many Misalignments; Few Subluxations

If a misalignment may be considered any vertebra seen on a radiograph not in its optimal relationship with the vertebra below, then each patient's spine presents many misalignments.

But every misaligned vertebra is not a subluxated vertebra. In fact, it is probable that very few are.

Figure 110: *With the Fifth Cervical Fixed, other Segments become Hypermobile through the same Range of Motion.*



When a vertebra is misaligned due to subluxation, the architecture of the entire spine is affected to some degree. The wedging of the disc causes the bodies of the vertebrae above to change direction and deviate from their normal perpendicular position. This veering does not continue all the way up the spine, however, for equilibrium would be lost and the weight of the body would not be balanced. At some point in the spine, one or more vertebrae must compensate for the loss of balance and equilibrium by misaligning in a direction opposite to the subluxation. This misalignment is a compensating mechanism, and is an attempt to re-establish normal balance to the spine. Figure 111 shows misalignments due to subluxation, and the compensatory misalignments above.

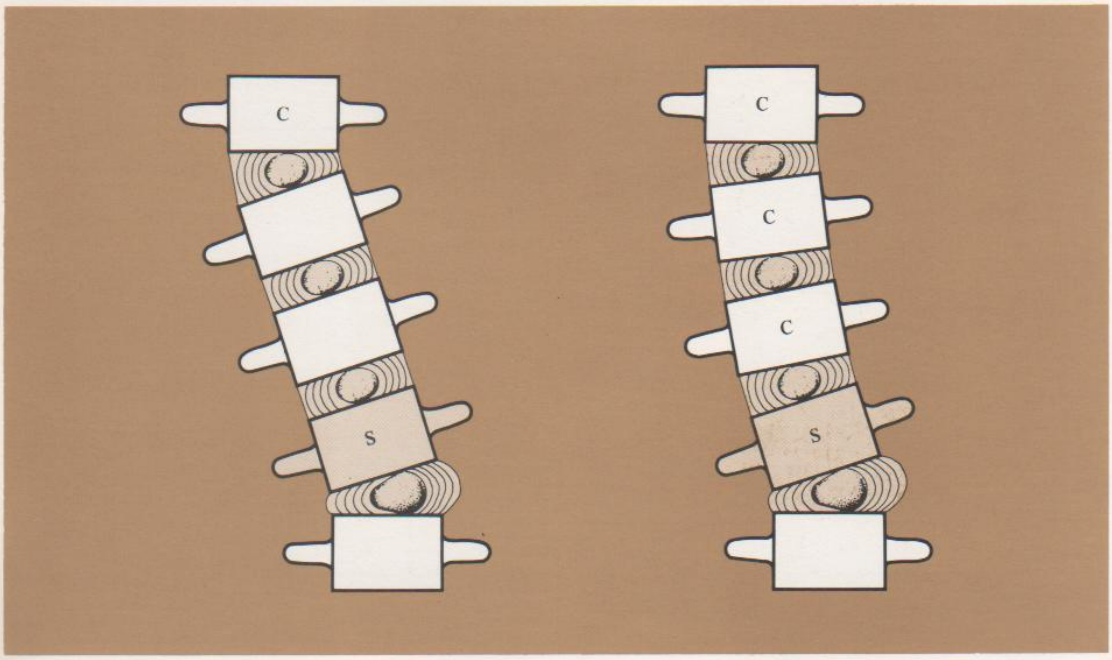
A vertebra which is misaligned because of a subluxation elsewhere is considered a *compensation*. Compensating vertebrae are neither fixed nor subluxated; that is, they move freely because their nuclei are intact, and there is no disc protrusion caused by inflammation. Consequently, no nerve pressure is produced. *For every subluxation, there is compensation.*

Just as a hypermobile vertebra may show excessive motion, so might a compensating vertebra show *excessive misalignment.* For this reason, and with regard to one of the previously posed questions, if the most misaligned vertebra is selected for repositioning, it could be a compensation, in which case "adjusting" it would produce no change, structurally or symptomatically, since the compensation is freely movable, not subluxated, and performing its normal function. And if it is freely movable, to answer the other question, it would accommodate itself to the patient's changes in position, and its direction of misalignment could vary with the type of radiograph taken.

Where in the spine compensations occur, and the number of compensating vertebrae produced by each subluxation, depends on such factors as where the subluxations occur, the direction of misalignment of the subluxation, the patient's weight distribution, and congenital malformations.

Due to these many variables, compensations may be few or many. Since they appear as misalignments on the film just as subluxations do, and because the film does not reveal which vertebrae are producing nerve pressure, then the radiograph cannot be used to

Figure 111: *Misalignments due to Subluxation (S), and Compensatory Misalignments (C).*



distinguish which of the misalignments are subluxations. In other words, *the subluxation cannot be determined from the film.*

Mechanical Film Analysis

One might think that a film analysis system could be devised that would enable the subluxations to be differentiated from the compensations.

For example, in an A-P projection, the level of the sacrum could be considered the base, or foundation, for the entire spine. The first vertebra to misalign from the sacral level, considering from inferior toward superior, would be a subluxation. The next misalignment above that which returns to a normal level, one parallel with the sacrum, that is, would be the compensation. Then, the next one above the compensation to deviate from normal would be another subluxation, and so forth, up the spine.

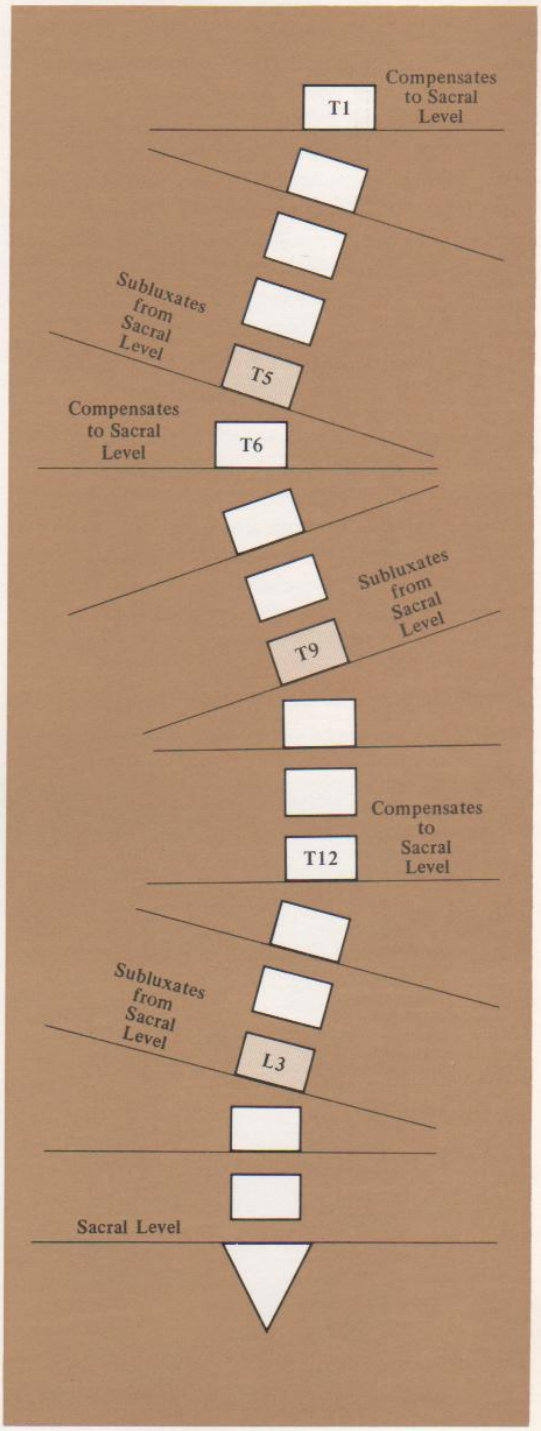
In figure 112, misalignments are found at third lumbar, and at the twelfth, ninth, sixth, fifth and first thoracics. The third lumbar, and the ninth and fifth thoracics would be subluxations, since they deviate from the sacral level. The twelfth, sixth and first thoracics would be compensations, since they misalign back to the sacral level.

If, according to such a system, all the subluxated misalignments were repositioned, then all the vertebrae would assume their optimal relationships, and the spine would be corrected. This could be presumed because realigning the subluxations would allow the freely movable, self-rectifying compensations to align themselves. Figure 113 shows successive stages of correction with the third lumbar, fifth thoracic and ninth thoracic subluxations being realigned, respectively. In each stage, an "abnormal" is realigned to a "normal", and the outcome is total spinal alignment.

Mechanical System not Reliable

Such a purely mechanical interpretation of the film might be effectual if all the vertebrae were perfectly formed segments, if the sacrum was level, and if no other anatomical or physiological variables existed. In fact, there is a high correlation between actual existing subluxations, and those determined to be subluxated from this mechanical analysis method just presented. But since the many variables prevent a perfect correlation, such an approach is not in the

Figure 112: *One Example of Mechanical Analysis with a Level Sacrum.*



best interests of the scientific practitioner or the sick patient.

The alternative procedure recommended is to locate the subluxation by examining the patient for signs of nerve pressure, disc inflammation and fixation. *Emphasis is placed on finding the* nerve *involved.* When the area of subluxation is determined on the basis of such physiological and pathological evidence, the possibility of error is minimized.

Sometimes the film may be used to give supplemental information to aid in the determination when the other evidence is not conclusive, but it should never be used as the determining factor.

Reposition the Vertebra

Replacing the vertebra properly onto its disc is what the chiropractor must do to correct it. The vertebra must be *repositioned* so that the misalignment is reduced and the nucleus will return toward the center. As this is accomplished, the inflammation will subside, the fluid will be absorbed, the swelling will reduce, and decompression of the nerve fibers will occur, relieving the nerve dysfunction.

Once the misalignment is completely reduced, and the nucleus no longer exerts damaging pressure, the

Figure 113: *Successive Stages of Correcting Three Subluxations.*

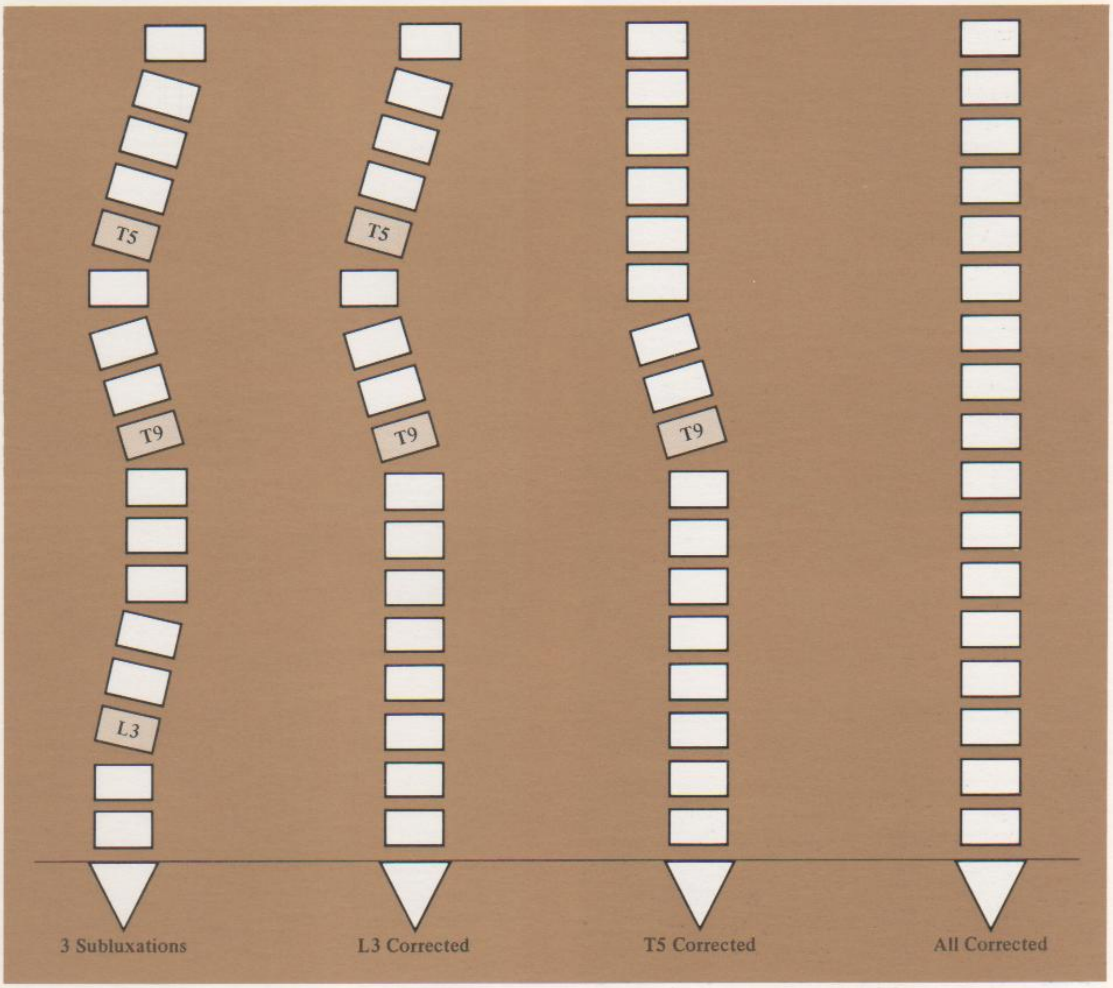


Figure 114: *"Pre" and "Post" Films Showing Structural Changes After Repositioning 5th Lumbar and 8th Thoracic Vertebrae.*

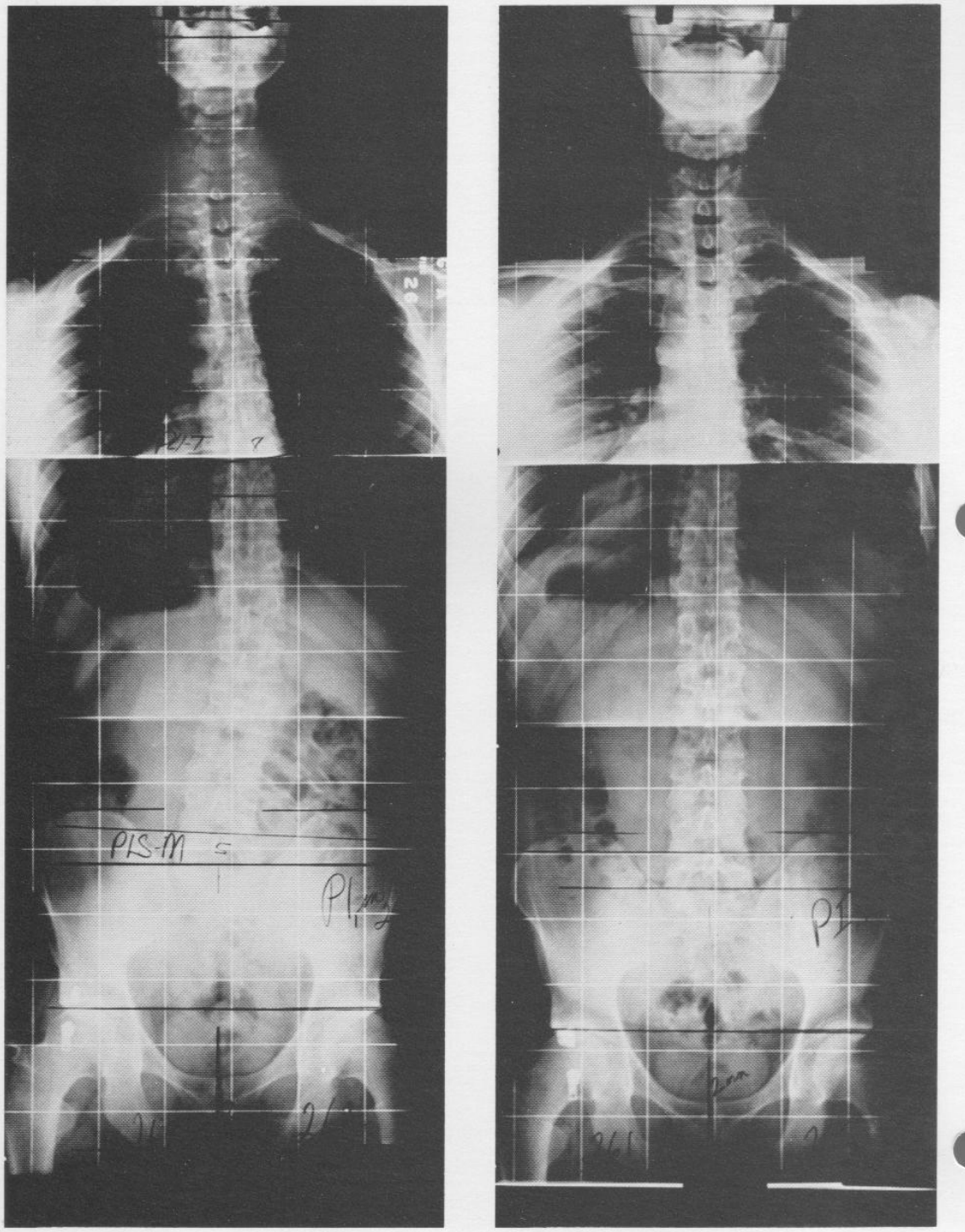
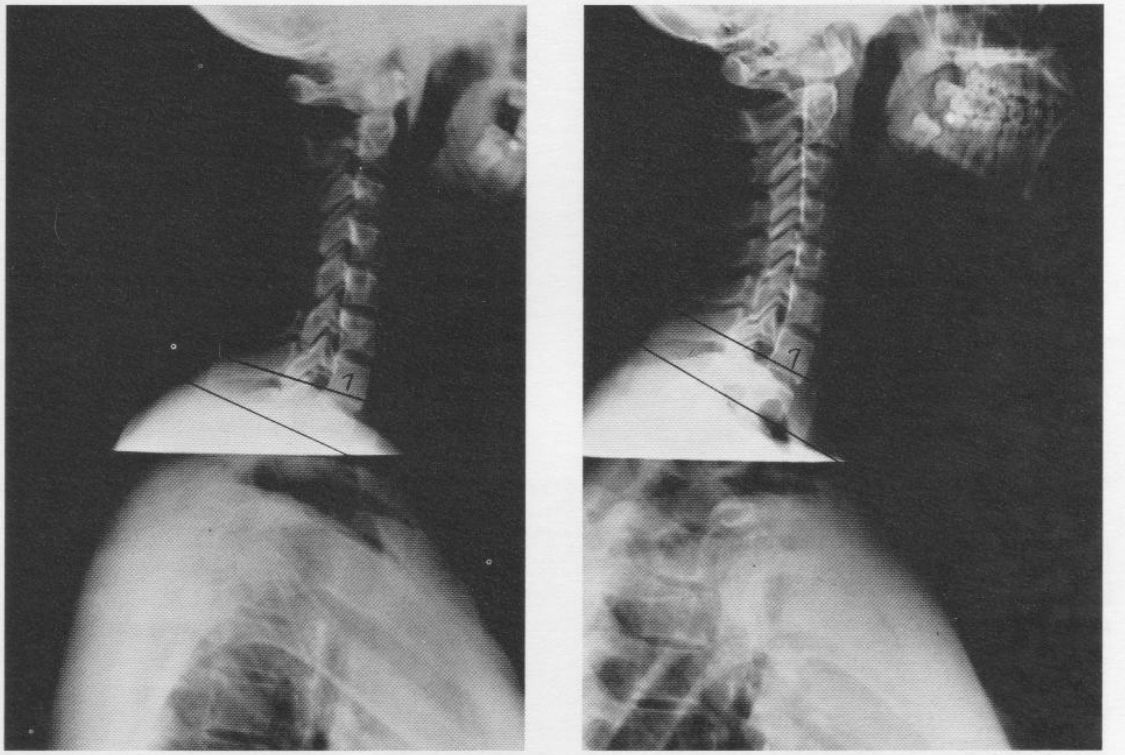


Figure 115: *"Pre" and "Post" Films Showing Cervical Curve Changes After Repositioning 7th Cervical Vertebra.*



deranged annulus fibers will be replaced with fibrous tissue. When the disc has reached this stage of repair, the vertebra will be stable, and function as normally as ever. This, of course, presupposes that no intervening traumata occur.

Figures 114 and 115 show "pre" and "post" films, illustrating the structural changes that can occur when the vertebra is repositioned on its disc.

It must be stressed that the chiropractor's aim should be to locate and correct subluxations, and not to straighten spines. If he corrects subluxations, the compensatory misalignments will rectify themselves. Misalignments from other factors, such as malformations, will be allowable and "normal" for that particular patient.

Purpose of Films

Since the radiographs are not obtained for the purpose of locating subluxated vertebrae, it should be made clear just how they are used.

Lateral Full Spine Film

After having located the area of subluxation on the patient, *the lateral film is utilized to determine* which vertebra *is responsible.* The lateral film reveals this by allowing the physiological and pathological findings to be correlated to the patient anatomically. In other words, "we match the patient to the film, and not the film to the patient".

A-P Full Spine Film

After determining which is the offending vertebra, we analyze the A-P film to determine in what direction it has misaligned. Therefore, *the A-P film discloses* how *to correct it.*

In addition to these fundamental uses, the radiographs are utilized in other ways. For instance, the lateral film tells something about the subluxation after the causative vertebra is located. Its acuteness or chronicity is revealed through analysis of the disc space. The degree of misalignment posteriorward and

inferiorward, and the specific line of correction from posterior to anterior, is also obtained from the lateral view.

From the A-P film, the condition of the pelvis can be evaluated, an anatomically deficient leg can be determined and measured, and the total spinal architecture can be studied.

Subluxation Without Discs

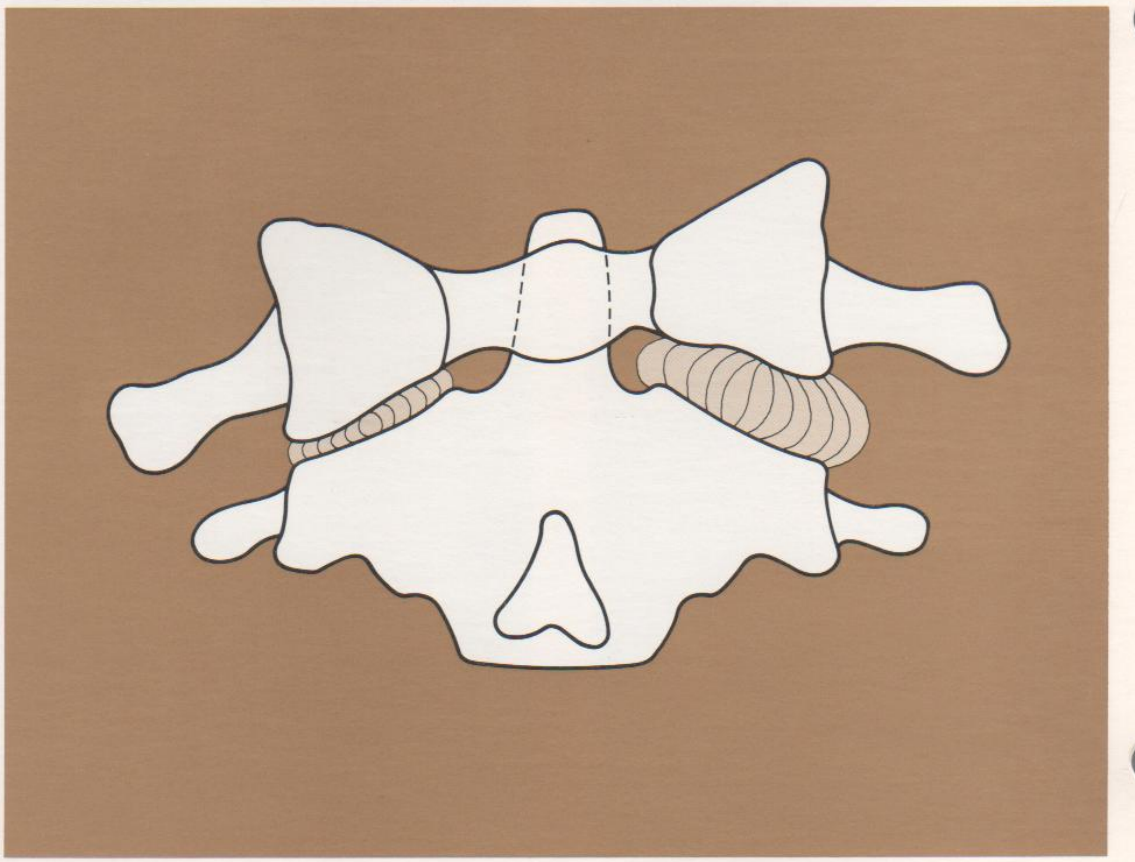
The discussion of subluxation in this chapter has been limited to vertebrae with discs. It is recognized that nerve pressure may exist in areas where there are no discs. For example, no intervertebral discs are found at the atlanto-axial or atlanto-occipital articulations. Nor are there any at the sacroiliac articulations, or at other joints where nerve compression may occur.

However, the mechanism of subluxation at such areas is similar in that nerve dysfunction results from the protrusion of ligaments other than intervertebral discs, usually the articular capsule. Their tissues become deranged from misalignment, and the resulting inflammatory edema causes protrusion (Fig. 116). The following, more inclusive, definition applies:

A subluxation occurs when two osseous structures become misaligned to the degree where interarticular protrusion from intra-articular swelling produces compression of nerve fibers.

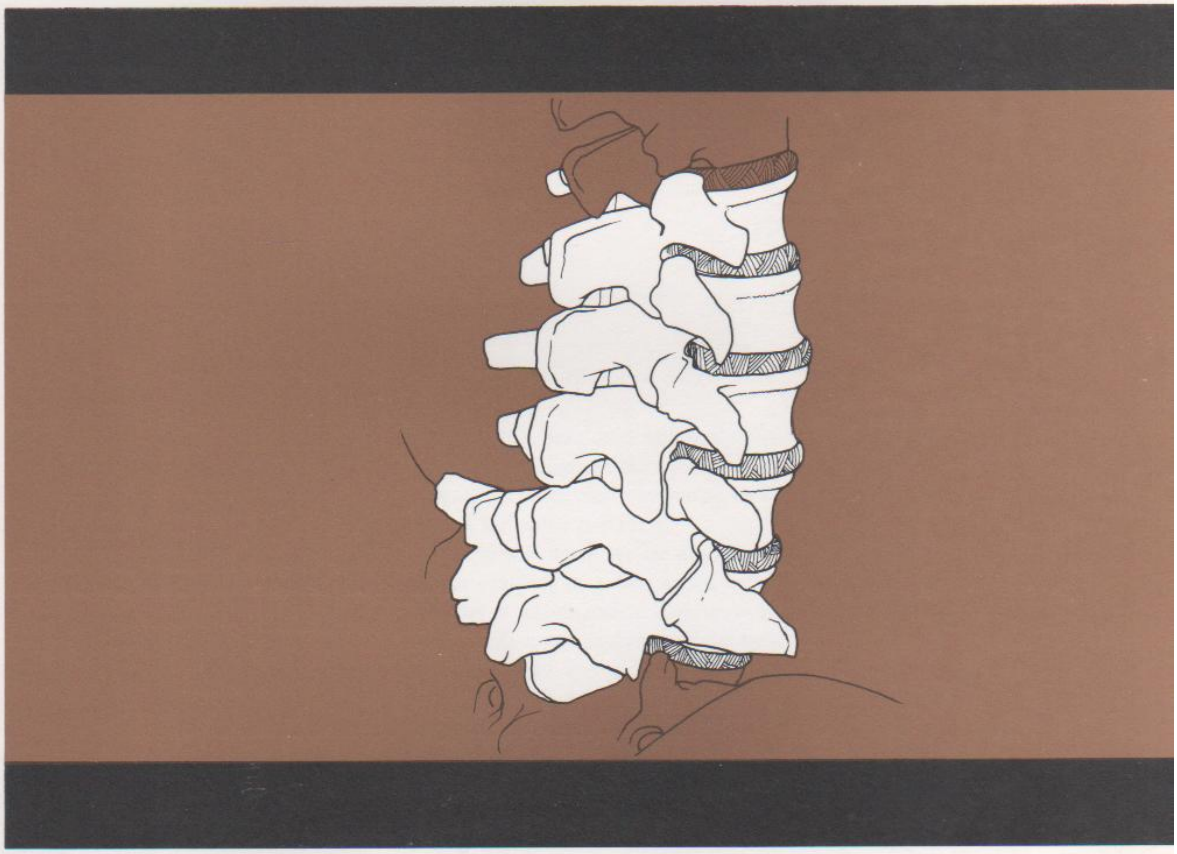
It should be acknowledged that sometimes, instead of interarticular protrusion compressing the nerves, the pressure comes directly from the inflammatory edema in the perineural tissues.

Figure 116: *Protrusion of the Articular Capsule may cause Nerve Pressure at the Atlanto-Axial Articulation by Compressing the Spinal Cord or Nerve.*



Lumbar Misalignments

Chapter 6



Gonstead Chiropractic Science & Healing Art

Chapter 6

Lumbar Misalignments

After the doctor has examined the patient and has determined which vertebrae are causing nerve pressure, he turns to the radiograph to find out *how* the subluxations must be corrected.

By properly analyzing the images on the x-ray film, the relationship between the subluxated vertebra and the vertebra subjacent to it can be ascertained. This relationship can be expressed by using "listings", letter abbreviations which represent the position of the subluxated vertebra, and the directions in which it has misaligned.

Due to the various directions of misalignment, there are many possible positions of subluxation. But the chiropractor must know precisely which position the vertebra has assumed in order to correct it. Through accurately interpreting the listing, and by forming a mental image of the subluxation, he should be able to deliver the one distinct thrust which will properly reposition the vertebra.

If the thrust is improperly directed, its result could mean no correction, a partial correction only, or worst of all, an increase in the misalignment. Its effect, in other words, would be no "results" at all.

Much has been said about x-ray image distortion, and how it renders film analysis inaccurate and unscientific. Particularly censured by some has been the use of full-spine A-P films.

But in this work we are not concerned with quantitative evaluations as we would be if we were locating tumors or doing cardiac mensuration.

Instead, x-ray analysis, as defined here, is a *comparative* study.

Basically, it is the comparison of the subluxated vertebra with the vertebra directly beneath it. But specifically, it is comparing sizes, shapes, directions and positions of adjacent structures on adjoining segments.

The objects of comparison are always in such close proximity that they are, for all practical purposes, distorted proportionally. Therefore, the effect of image distortion is relative, and can be disregarded since both segments are affected by it equally.

Chapter six explains the directions of misalignment of the lumbar vertebrae, their positions of subluxation, and how they appear, distorted though they may be, on the full-spine A-P film.

Directions of Misalignment

The previous chapter explained that two vertebrae have optimal alignment when the margins of their bodies are in line, and there is no wedging of the disc between the two adjacent vertebral plates. Any deviation from this optimal relationship constitutes vertebral misalignment (Fig. 98).

Before the direction in which something moves can be expressed with meaning, there must be established a point of reference. When considering the directions in which a vertebra travels when it becomes misaligned, we use the subjacent vertebra as a reference point.

The necessity for establishing a reference point may seem almost too obvious to warrant explaining, but often we hear someone describe a lumbar scoliosis, for example, in terms of "lumbars two, three and four subluxated to the right".

Since a vertebra misaligns on its disc, and the disc separates the two adjacent vertebral bodies, then *misalignment is expressed in terms of changes in the relationship between the two bodies.* This does not mean that the structures of the vertebral arches remain stationary, or that their changes in position are not important, for these too help reveal misalignment. But because the subluxation occurs at the intervertebral disc, emphasis is placed on changes in position of the body.

Posterior Misalignment

The primary direction of misalignment of all vertebrae, excepting atlas, is posteriorward. When a verte-

Figure 117: *Lumbar Vertebrae in Radiographic and Diagrammatic Views.*

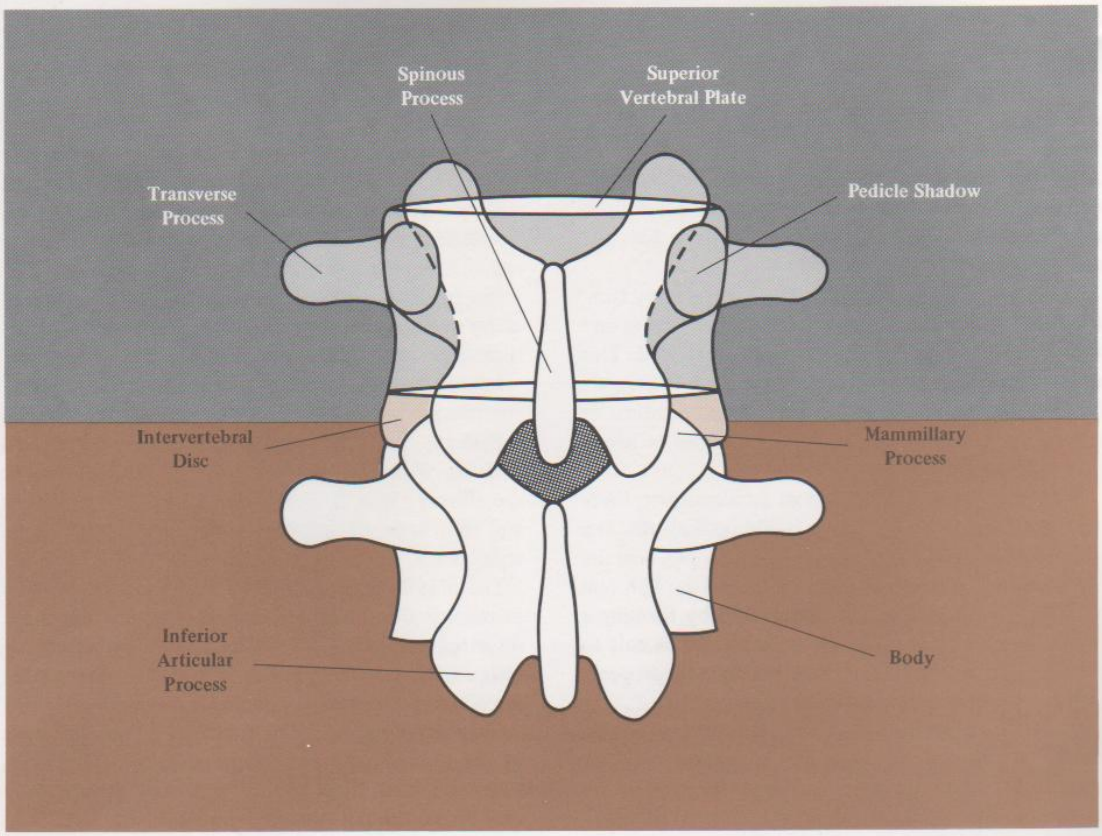
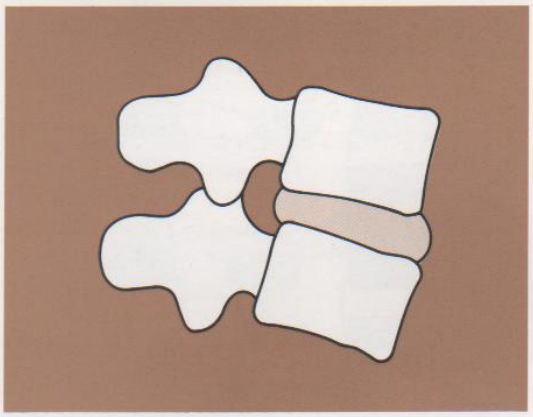


Figure 118: *A Posterior Vertebra Slips Backward in Relation to the One Below.*



bra slips backward, in relation to the vertebra below, the posterior border of its body is behind that of the lower vertebra, as in figure 118. Posterior misalignment is detectable from the lateral film, and will range in degree from slight to very significant.

The previous chapter indicated that a lumbar vertebra will usually, although not always, misalign inferiorward as well as posteriorward, because the disc is wedged by the nucleus going forward (Fig. 102). The direction of inferiority is not included in the lumbar listing because the amount of inferiority can be derived from the disc listing (D_3, D_5, etc.), which indicates wedging as well as disc degeneration.

Because posteriority is always a factor when vertebral misalignment exists, it is the first direction indicated in the listing. *The letter "P" in the listing denotes posteriority.*

Cannot Subluxate Anteriorward

Except for the atlas, a vertebra is unable to be subluxated anteriorward because of the barrier provided by the superior processes of the vertebra below. When someone speaks of an "anterior subluxation" they are usually thinking that the vertebra below has slipped out from under the vertebra above, instead of slipping off of its foundation (the disc), and they are harboring the concept that a subluxated vertebra "has lost its proper juxtaposition with the one above . . . ."

While it is true that the lower segment may be *situated* anterior to the one above, it is the upper vertebra which has slipped, posteriorward, in order for that situation to exist.

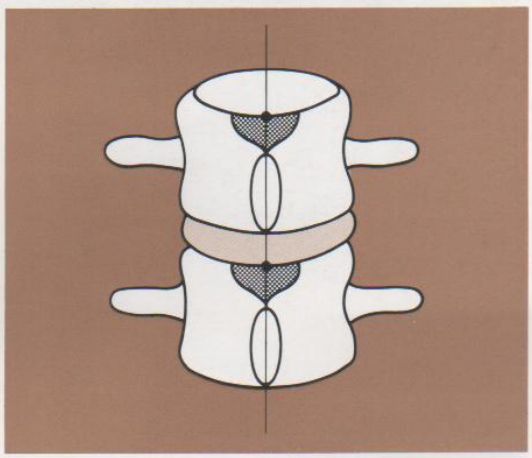
Sometimes, as in the cervical spine, the bodies will appear to be anterior under certain conditions, but these are compensations instead of subluxations. Also, there are rare instances where the lower vertebra must be repositioned forward, to the vertebra above, but these occur with anomalies, or where there have been structural changes from ligament avulsions or fractures.

Body Rotation

In addition to posteriority of a segment, there is usually accompanying rotation of the body. Body rotation can best be illustrated in the P-A and slightly superior view, showing how the body of the subluxated vertebra circumrotates in relation to the body of the vertebra below.

Figure 119 shows two aligned segments with dots placed in the middle of the posterior-superior borders of the bodies, above and forward of the spinous process. In figure 120, the upper body has rotated so

Figure 119: *P-A and Slightly Superior View Showing No Body Rotation.*



that the dot is displaced to the right, indicating that the *posterior* portion of the body has rotated to the right (PR).

Because the spinous process is a mid-line structure, it moves laterally in the same direction that the middle, posterior portion of the body rotates. We can say, therefore, that the body has rotated the spinous

Figure 120: *The Body Has Rotated the Spinous Process to the Right.*

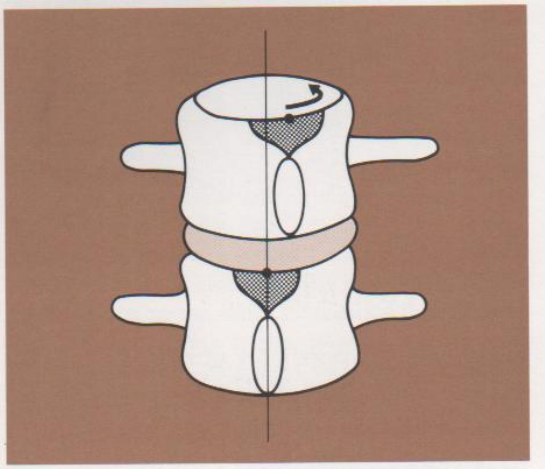


Figure 121: *The Body Has Rotated the Spinous Process to the Left.*

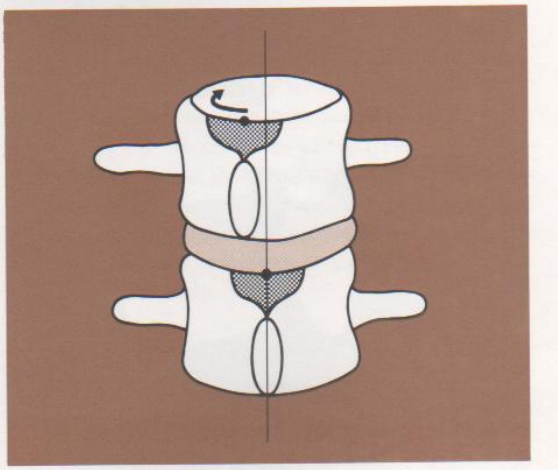
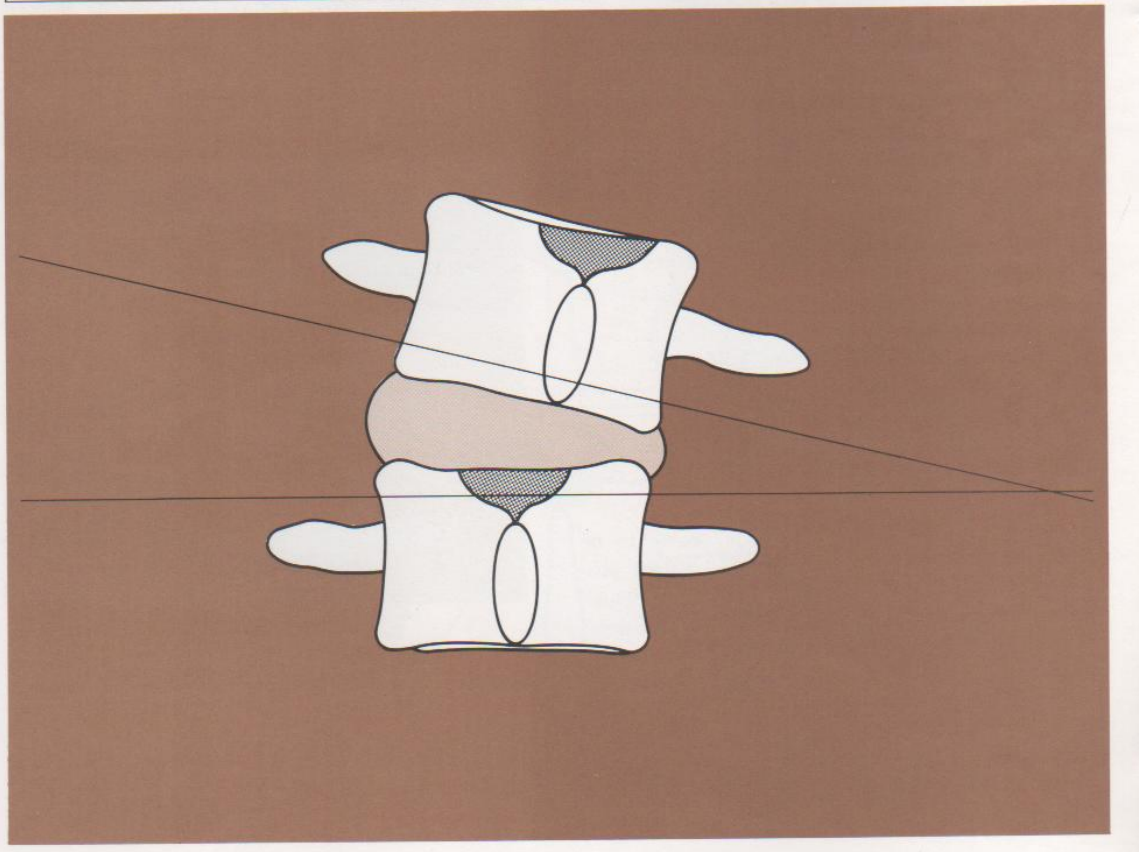


Figure 122: *Lateral Wedging; Lines Drawn Through the Vertebral Plates Form an Angle.*



to the right, and that *the second letter of the listing designates the lateral position of the spinous process caused by rotation of the body.* (Note: Previous references have been made in the text to "the side of lumbar body rotation" (Ch. 2, 3). This refers to the side opposite that to which the spinous process is located. In other words, when the body rotates the spinous to the right, the left side may be considered "the side of body rotation".)

Figure 121 shows a vertebra in which the body has rotated the spinous to the left (PL). PR and PL are not complete listings, as will be explained further in the chapter.

Lateral Wedging

In addition to posteriority and rotation, there is still another direction in which a vertebra can misalign.

This occurs when the upper vertebra tilts in relation to the lower one so that when viewed on the A-P film, the planes of the two opposing surfaces of the vertebral bodies are no longer parallel. In other words, lines drawn on the film through the superior and inferior vertebral plates which border the disc will form an angle as a result of the disc being wedged (Fig. 122). This misalignment is called "lateral wedging", and occurs because the vertebral body is tilted on its disc.

When there is lateral wedging, the nucleus goes laterally to the wide side of the wedge, as well as to the front. That is, it goes anterolaterally. The lateral radiograph will show the wedged effect in the A-P direction, whereas the A-P film will show the effect laterally. Both views should be studied in order to visualize the true position of the body on its disc.

From looking at figures 123 and 124, it can be seen that the vertebral body can rotate the spinous process to either the "open side of the wedge" or to the "closed side of the wedge". The body is raised on the open side of the wedge, and is considered "superior". On the closed side it is regarded as "inferior", being lowered. *The third letter of the listing designates the position of the body, inferior or superior, on the side of spinous laterality.* Superior is designated by the letter "S", and inferior by the letter "I".

Do not confuse the inferior of lateral wedging with the aforementioned inferiority of the entire vertebra, as seen from the lateral film. The entire segment could have inferiority without there being (inferior) lateral wedging, or there could be lateral wedging without inferiority of the entire segment. Remember, inferiority seen in the lateral view is not listed, except by listing the disc.

Figure 125 shows the four basic positions of subluxation in the lumbar spine when posteriority, rotation and lateral wedging are involved.

Figure 123: *The Body Has Rotated the Spinous to the Open Side of the Wedge.*

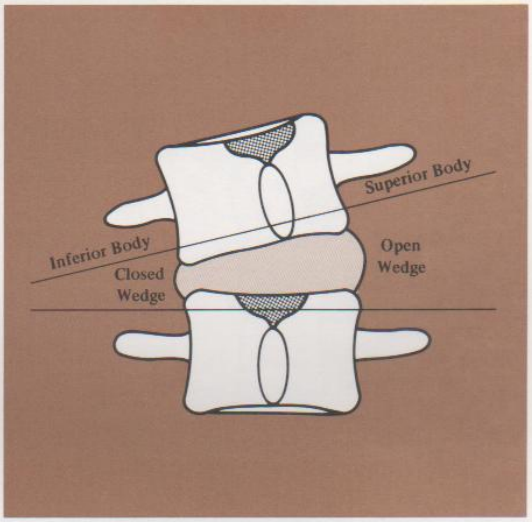


Figure 124: *The Body Has Rotated the Spinous to the Closed Side of the Wedge.*

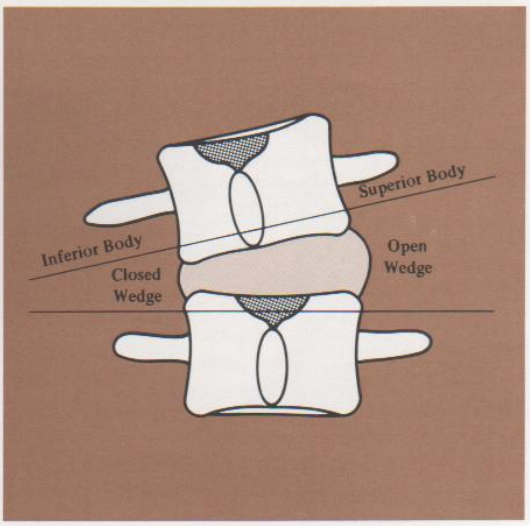
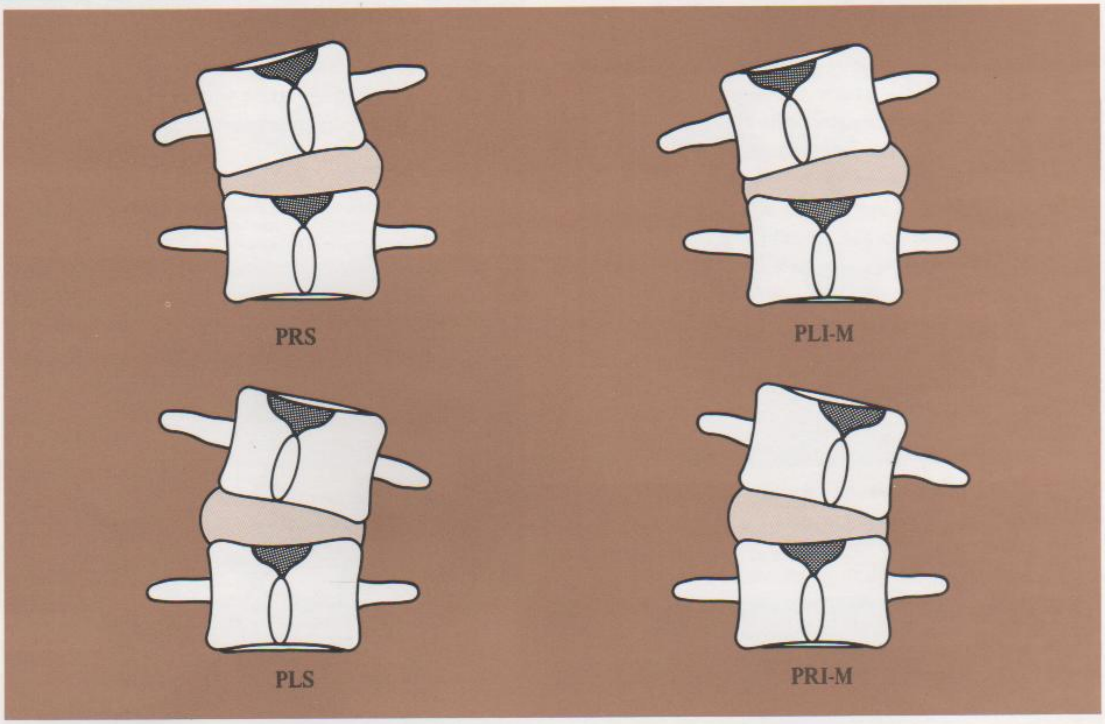


Figure 125: *The Four Basic Positions of Subluxation Involving Posteriority, Body Rotation and Lateral Wedging.*



Listing the Contact Point

In addition to the directions of misalignment, the lumbar listing also designates where the vertebra must be contacted for repositioning; that is, on which anatomical structure the thrust is given. The thrust is always made in such a way that the three basic misalignment factors, namely, posteriority, body rotation, and lateral wedging, will all be corrected simultaneously. However, the point of contact will vary between the spinous process and the mammillary process, according to the circumstances.

When the vertebral body has rotated the spinous process to the open side of the wedge, listed PRS or PLS, the contact point for correction is the spinous process. The thrust, when properly applied to the spinous, will correct the posteriority by moving the body anteriorward, will rotate the body back to center, and will close the wedge.

With a PRS listing, the thrust will move the spinous from the right, back to center. If the listing is PLS, the spinous moves from left to center. Since with either of these listings the spinous is always the contact point, no additional designation is needed for the listing.

When the spinous process is rotated to the closed side of the wedge, the mammillary process on the opposite side (i.e., on the open side of the wedge) must be contacted. The reason for this is that the segment must always be contacted in a way that will close the open side of the wedge. To contact the spinous process when it is rotated to the closed side will correct the posteriority and rotation, but it would increase the lateral wedging. This is so because the nucleus pulposus is pushed further anterolaterally when the body is lifted from the low side to the high side. However, if the body is directed *down* on the high side, the nucleus will be forced back toward the center. To do this, and to correct the body rotation and the posteriority at the same time, the thrust is applied through the mammillary process on the open side of the wedge.

Whenever a mammillary contact is indicated, the letter "M" is added to the listing, being preceded by a

dash. The listings are either PLI-M or PRI-M (Figure 125).

To clarify these two different conditions, the following summary is offered:

1. *If the spinous process is rotated to the open side of the wedge, the complete listings are PLS or PRS. It is not necessary to specify the contact point since it is always the spinous process.*
2. *If the spinous process is rotated to the closed side of the wedge, it is listed PLI-M or PRI-M, and the point of contact, which is the mammillary process, is designated by the letter "M".*

No Lateral Wedge

If there is no lateral wedge between the subluxation and the subjacent segment, and just posteriority and body rotation exists (PL or PR), then the point of contact for correction must be indicated. This is necessary because PL or PR can exist under differing circumstances, which may require altering the contact point.

When there is either PL or PR, and there is no accompanying scoliosis in the lumbar spine, then the contact point is always the spinous process, and the listing is PL-Sp or PR-Sp, respectively.

But when there *is* a scoliosis, one of two things can occur:

1. The spinous can rotate to the *convex* side of the scoliosis, in which case the spinous process would still be the contact point (Fig. 126). Remember, there would be no wedge between the two vertebrae in question, but there would be a lumbar scoliosis. The listing would again be either PR-Sp or PL-Sp.
2. The second possibility is for the spinous process to rotate to the *concave* side of the scoliosis (Fig. 127). This would require the mammillary process on the opposite side to be the contact point, and the listings would be PL-M or PR-M.

Figure 126: *PR-Sp; the Spinous is Rotated to the Convex Side of the Scoliosis–Spinous Contact.*

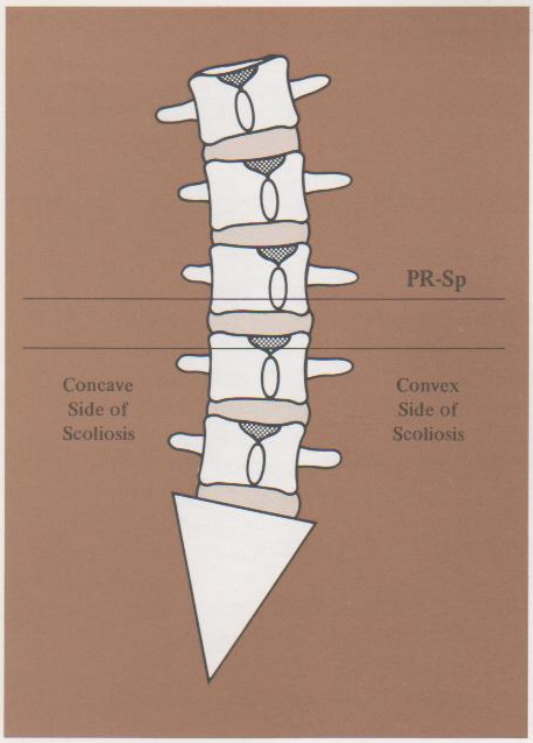


Figure 127: *PL-M; the Spinous is Rotated to the Concave Side of the Scoliosis–Mammillary Contact.*

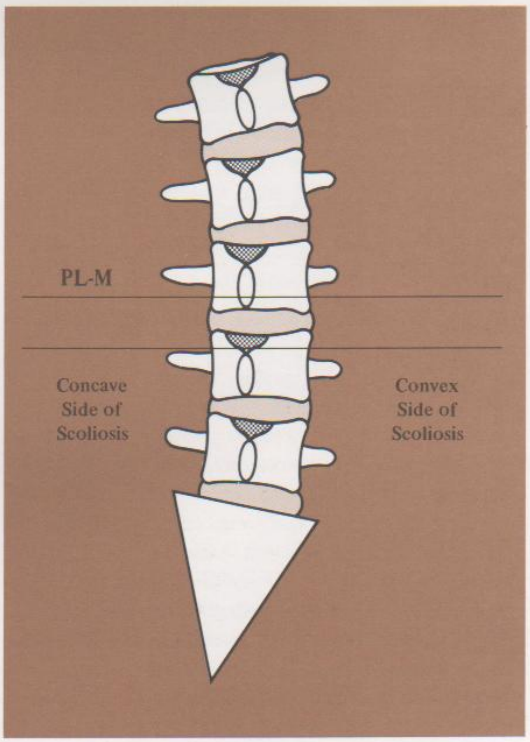
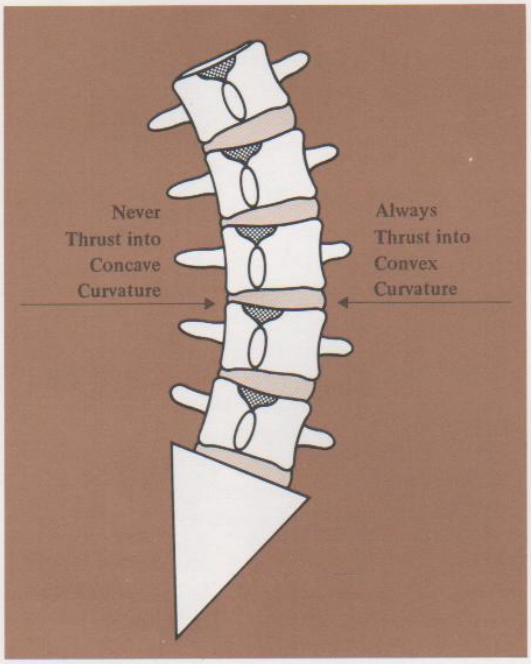


Figure 128: *Always Thrust to Decrease the Scoliosis.*



If the spinous process were used as the contact point, the thrust would tend to increase the scoliosis because it would be delivered into the concave side of the curvature.

For example, with a PL-M listing, where the scoliosis was convex to the right (Fig. 127), the thrust should be made on the right mammillary, since this would tend to reduce the scoliosis. To thrust on the spinous from left to right would tend to increase the scoliosis, and is contraindicated.

Thus, the following cardinal rule can be stated: *A thrust is never made in such a way that it would increase the lateral scoliosis, that is, into the concave side of the curvature* (Fig. 128).

Fifth Lumbar Differences

The rule to never thrust into the concave side of a scoliosis is so invariable that certain considerations are made as a result of it in relation to listing and repositioning the fifth lumbar.

A lumbar scoliosis infers that the vertebrae involved

Figure 129: *PRS-M, Fifth Lumbar.*

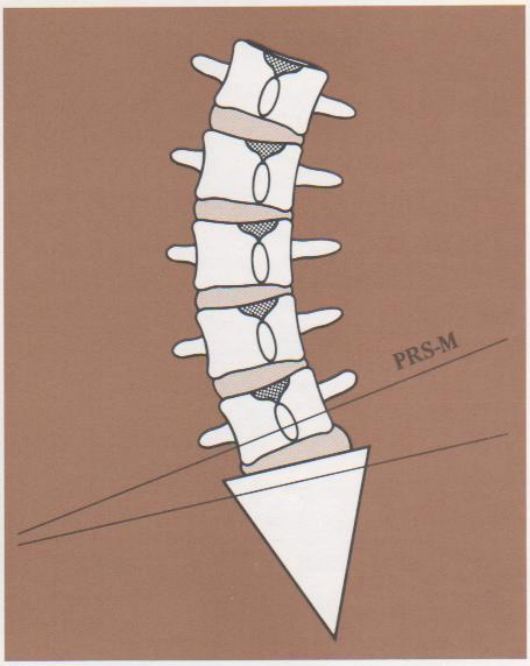


Figure 130: *PLI-Sp, Fifth Lumbar.*

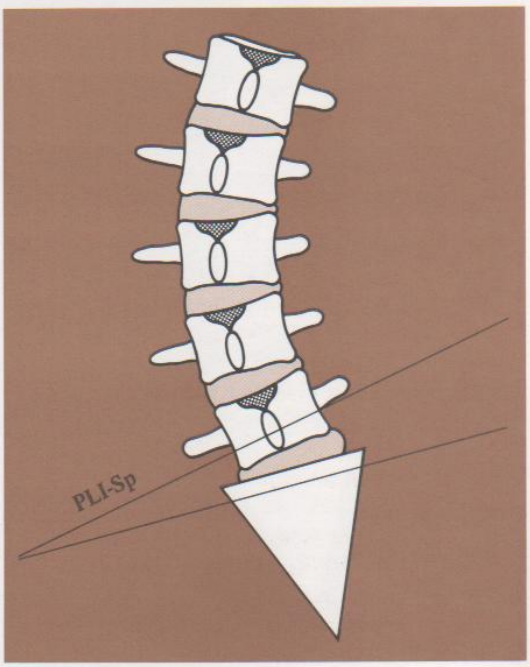


Figure 131: *The Lumbar Listings.*

LISTING	POSTERIORITY	ROTATION	OPEN WEDGE	SCOLIOSIS	CONTACT POINT
L1–L4					
P	Yes	None	None	May Be Either	Spinous
PR–Sp	Yes	Right	None	May Be Right	Spinous
PRS	Yes	Right	On Right	May Be Right	Spinous
PRI–M	Yes	Right	On Left	May Be Left	Left Mammillary
PR–M	Yes	Right	None	On Left	Left Mammillary
PL–Sp	Yes	Left	None	May Be Left	Spinous
PLS	Yes	Left	On Left	May Be Left	Spinous
PLI–M	Yes	Left	On Right	May Be Right	Right Mammillary
PL–M	Yes	Left	None	On Right	Right Mammillary
L5					
PRS–Sp	Yes	Right	On Right	May Be Right	Spinous
PRS–M	Yes	Right	On Right	On Left	Left Mammillary
PRI–Sp	Yes	Right	On Left	On Right	Spinous
PRI–M	Yes	Right	On Left	May Be Left	Left Mammillary
PR–Sp	Yes	Right	None	May Be Right	Spinous
PR–M	Yes	Right	None	On Left	Left Mammillary
PLS–Sp	Yes	Left	On Left	May Be Left	Spinous
PLS–M	Yes	Left	On Left	On Right	Right Mammillary
PLI–Sp	Yes	Left	On Right	On Left	Spinous
PLI–M	Yes	Left	On Right	May Be Right	Right Mammillary
PL–Sp	Yes	Left	None	May Be Left	Spinous
PL–M	Yes	Left	None	On Right	Right Mammillary

are rotated and that they form a curvature of the spine to one side. The discs between the bodies of the segments involved will either have no wedging (e.g., with PR-M), or will have the open sides of the wedges on the convex side of the curvature.

However, the fifth lumbar will not always conform to this description, for it is possible to have the open side of the wedge (between the fifth lumbar and first sacral segment) on the side opposite the convexity of the scoliosis.

If this occurs, the spinous may rotate to either the open side of the wedge, or to the closed side of the wedge, presenting the following two kinds of listings which are in contradistinction to those previously mentioned:

1. *When the spinous rotates to the open side of the wedge, but the convexity of the scoliosis is on the opposite side, contact the mammillary process on the convex side of the scoliosis. This allows the listing to be PLS-M or PRS-M, peculiar to the fifth lumbar only* (Fig. 129).
2. *If the spinous rotates to the closed side of the wedge, and the convexity of the scoliosis is on that side, contact the spinous process on that same side. This allows either PLI-Sp or PRI-Sp, fifth lumbar listings exclusively* (Fig. 130).

While it was said earlier that the vertebral body cannot be lifted laterally onto the disc below because of the nucleus, this does not apply to the fifth lumbar. This is because the sacrum, being part of the

pelvic girdle, can be so stabilized that when the thrust is made, it acts as a firm foundation upon which the fifth lumbar body can be repositioned. Therefore, the fifth lumbar *can* be lifted laterally from the low side to the high side, as the unique listings would necessitate.

Because of the differences occurring with the fifth lumbar, the contact point for the thrust is included on all of its listings.

Figure 131 summarizes the characteristics of all the lumbar listings and shows how they compare.

Notice the first listing. While it is not frequently found, a vertebra may be posterior without any other misalignment factors, in which case it would be listed "P", and the contact would be made on the spinous process.

All of these variations may seem very confusing at first. Once the listing is determined by analyzing the film, the doctor should attempt to visualize the subluxation as it would appear in vivo. Not being able to do this makes it all but impossible to apply the thrust in the one exact direction that will align the vertebra. But being able to "see" the subluxation, as determined by the image on the film, should allow the doctor to deliver a thrust that will remove the posteriority, correct the body rotation, and reduce the wedge, all done in consideration of the scoliosis when one exists.

Lumbar Film Analysis

A person with severe symptoms will not necessarily have extreme misalignments. Sometimes even minor displacements cause serious conditions. It is just as important, therefore, that the doctor be able to recognize and interpret the obscure misalignments as well as the obvious ones.

By applying the following procedures, the analyst should be able to determine any of the lumbar listings.

Listing Posteriority

If a vertebra is subluxated, it should be assumed that posteriority is a factor. The lateral film should be viewed, nevertheless, to determine the degree of posterior slip. The amount of inferiority of the body should also be evaluated, as revealed by wedging of the disc in the A-P direction.

Listing Body Rotation

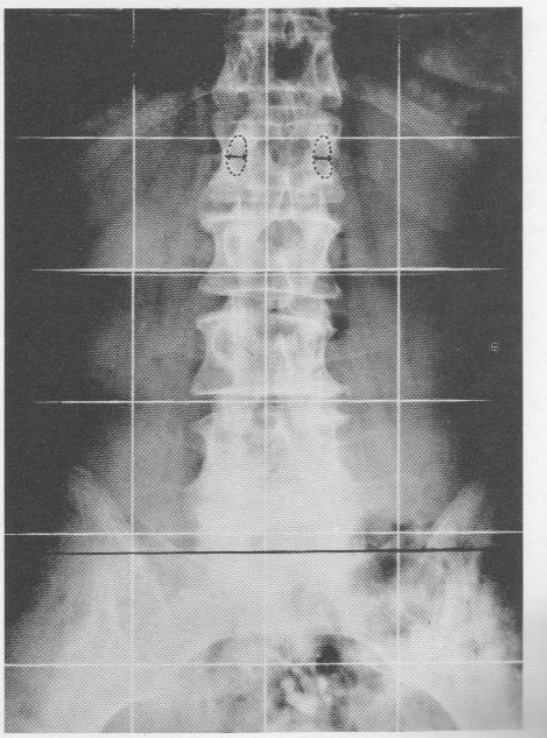
Body rotation is mainly determined by a visual analysis of the film. However, distances may be measured with the parallel when a visual scrutiny is inconclusive.

The lateral position of the spinous process will usually give a true indication of how the body has rotated, especially if the misalignment is severe. Sometimes, though, the spinous will be bent or so badly misshapen that its position will not be reliable.

A more dependable criterion of body rotation is changes occurring in the images of the pedicles. The following facts are applicable:

1. *When the body rotates the spinous to the right (PR), the right pedicle shadow will become more elliptical in shape, and more narrow transversely,*

Figure 132: *The Pedicle Shadow on the Side of Spinous Laterality Narrows.*



while the left pedicle widens transversely and becomes more circular in shape (Fig. 132).

2. *When the body rotates the spinous to the right (PR), the right pedicle shadow is displaced laterally to the margin of the body, whereas the left pedicle migrates toward the mid-line* (Fig. 133).

Naturally, the same rules apply with PL listings.

Another reliable source for determining body rotation is the changes in width of the inferior articular processes at their junctions with the laminae. *The width of the inferior articular process is less on the side of spinous laterality* (Fig. 134).

Using the inferior articular processes is especially helpful in determining fifth lumbar rotation, since its pedicle shadows are often not distinct. In measuring the widths of the inferior articular processes, the analyst must be careful not to include the borders of the sacral processes. Their images must be separated from those of the fifth lumbar inferior processes, so a false conclusion is not reached (Fig. 135).

Listing Lateral Wedging

Lateral wedging is determined by a method of line drawing which amplifies the relationship between the two vertebral bodies. Even the slightest amount of superiority or inferiority is indicated in the listing. If the lines are parallel, the listing will be either PL-Sp(PR-Sp) or PL-M(PR-M).

The line representing each body is drawn near the vertebral plate adjoining the disc, though never directly through the plate itself. To do so would interfere with seeing the disc space, which sometimes should be inspected. The lines should be made long, the full length of the parallel, so any wedging is made obvious. Various structures of the vertebra may be employed to determine where each line should be drawn.

Figure 133: *The Pedicle Shadow on the Side of Spinous Laterality is Displaced to the Lateral Margin of the Body, While the Opposite Pedicle Migrates Toward the Mid-line.*

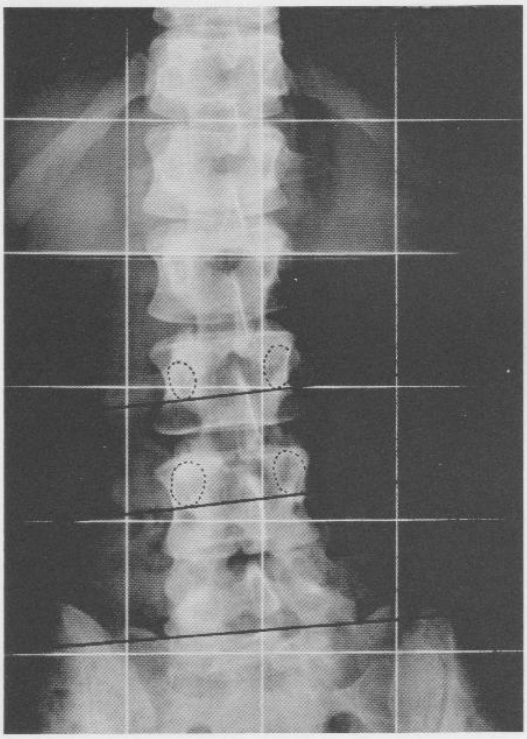
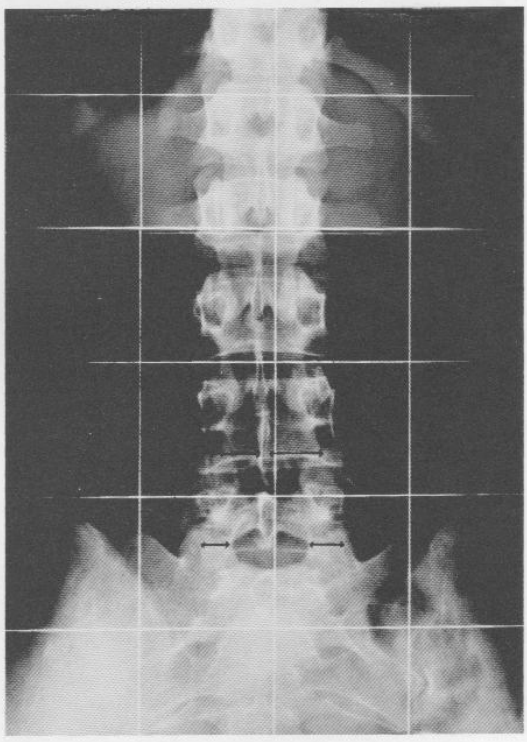
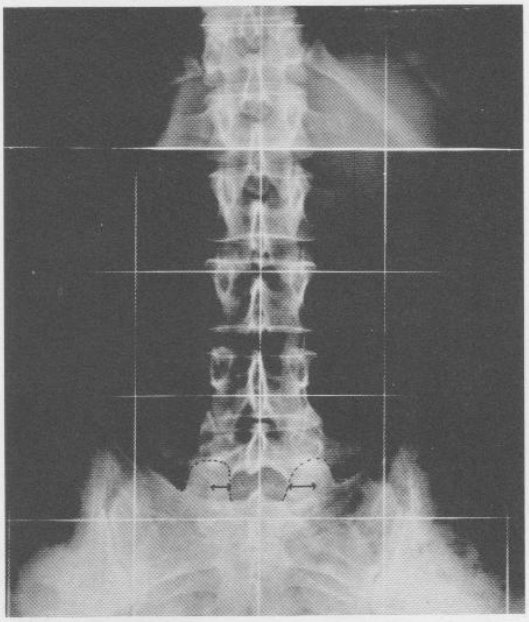


Figure 134: *The Inferior Articular Process Narrows on the Side of Spinous Laterality.*



The upper and lower vertebral plates of a body are usually parallel, and very representative. Sometimes, though, the body itself may be wedge shaped, in which case the vertebral plate adjoining the disc being analyzed should be used. When the vertebra is in a position which obscures the vertebral plates, certain lateral structures may be used.

Figure 135: *In Determining Fifth Lumbar Rotation, Do Not Measure the Sacral Processes.*



The "transverse-body junctions", that is, the points where the superior borders of the transverse processes appear to join the body, may be utilized, as well as either the superior or inferior borders of the pedicle shadows. Figure 136 illustrates these points on a film. The best procedure is to check them with the parallel, and then select a line which is most representative of the body plane line, being certain to draw it beyond the limits of the disc space.

When the fifth lumbar is being analyzed, it must be compared with the sacral plane line (Fig. 76). This is drawn through the right and left "sacral grooves", and denotes the superior border of the first sacral segment. The fifth lumbar plane line is compared with the sacral plane line to determine lateral wedging of the disc.

Figures 137 through 146 show examples of many of the lumbar misalignments discussed in this chapter. Although they are not always visible in these x-ray photographs, the listings are written on the plane line of the subluxated vertebra on the side to which the spinous process has rotated.

Figure 136: *Drawing the Body Plane Lines to Indicate Lateral Wedging.*

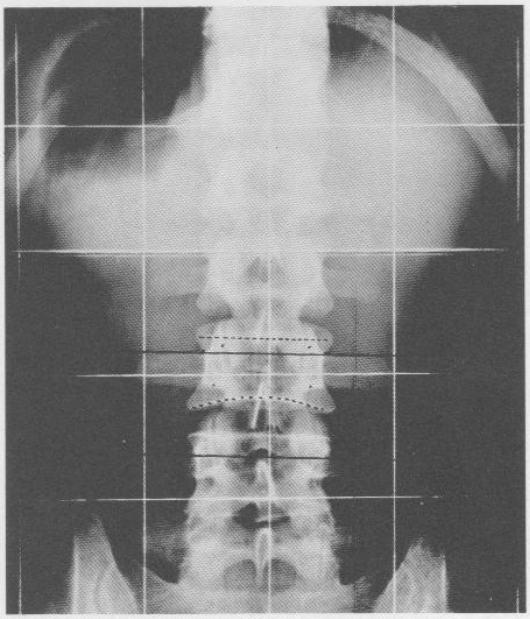


Figure 137: *Fifth Lumbar Listing, PRI-M; First Lumbar Listing, PRI-M.*

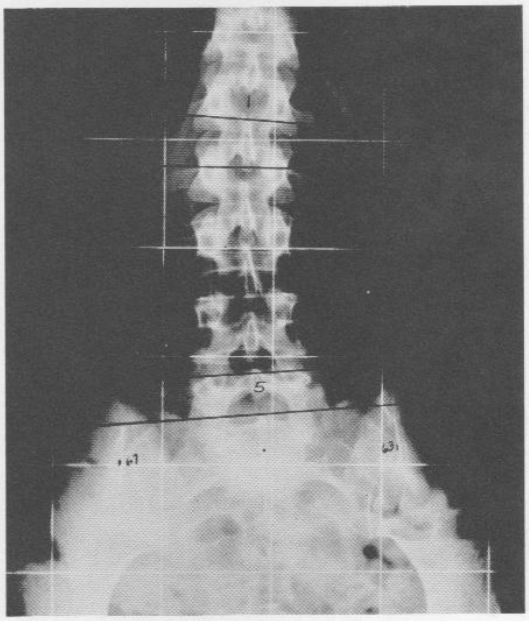


Figure 138: *Second Lumbar Listing, PLS.*

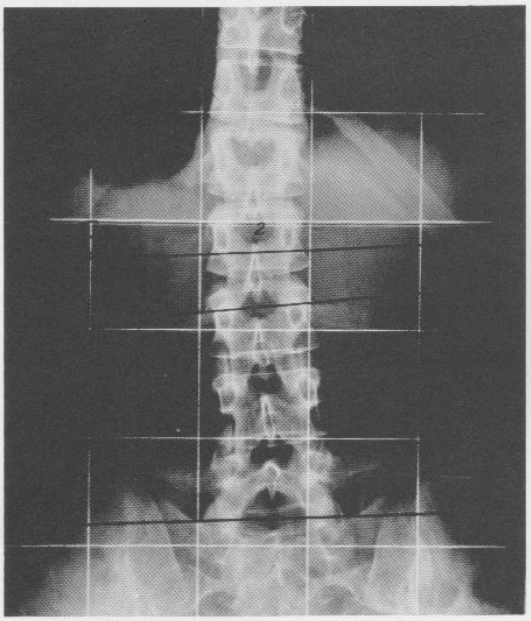


Figure 139: *Third Lumbar Listing, PL-M.*

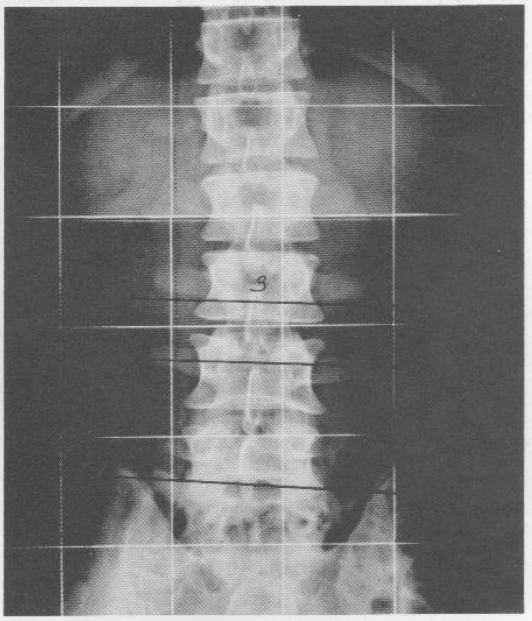


Figure 140: *Third Lumbar Listing, PRS.*

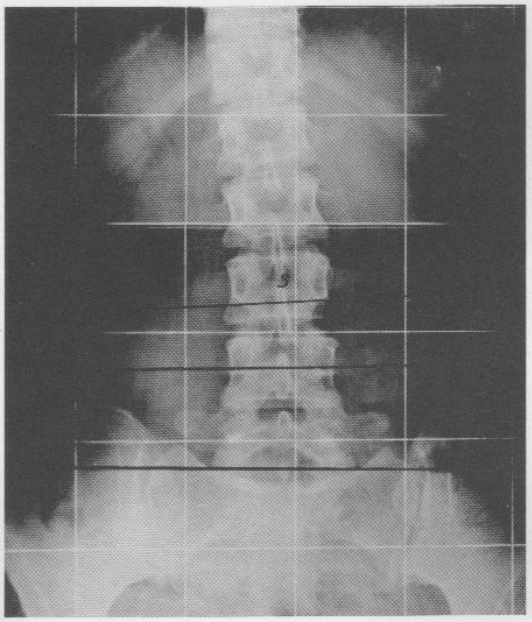
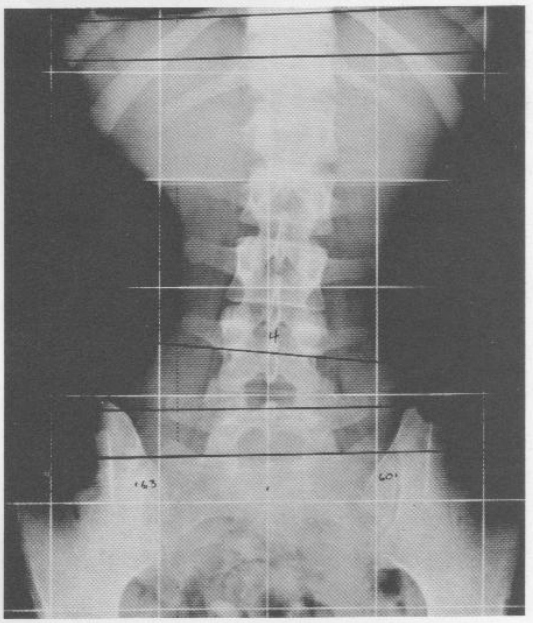


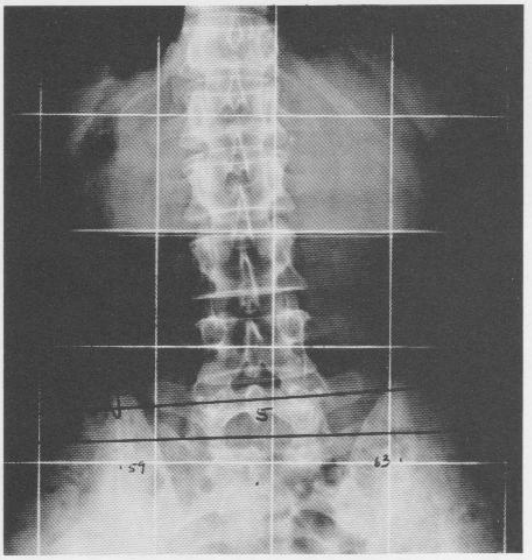
Figure 141: *Fourth Lumbar Listing, PLS.*



Consider Patient Placement

No mention has yet been made about "patient placement", that is, the orientation of the patient's spine to the radiograph.

Figure 142: *Fifth Lumbar Listing, PLI-Sp.*



All of the illustrations shown so far have the subjacent vertebra centrally positioned. This would be an ideal situation since it allows the subluxated vertebra to be compared with an image of symmetry. But usually the subjacent vertebra will not be perfectly oriented to the film. The doctor must always keep in mind that he is comparing the image of the subluxation to the position of the subjacent vertebra, and not necessarily to an ideally situated segment. This particularly applies to body rotation.

For example, if the rotation of the fifth lumbar is being evaluated, consideration must be given to the rotation of the sacrum (whether from sacral subluxation or patient placement) to see if *its rotation* would affect the fifth lumbar listing. Fortunately, it takes a great amount of mis-orientation of the patient's spine to change the listing from how it appears on the film, but whenever the actual position of the vertebra seems ambiguous, the listing may be confirmed by motion palpation.

Figure 143: *Fifth Lumbar Listing, PRS-M.*

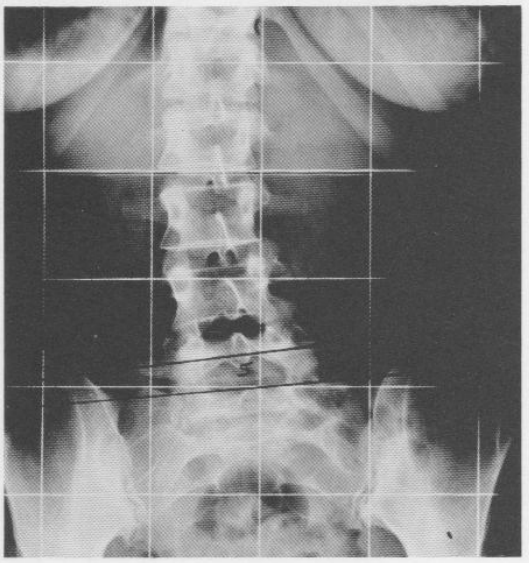
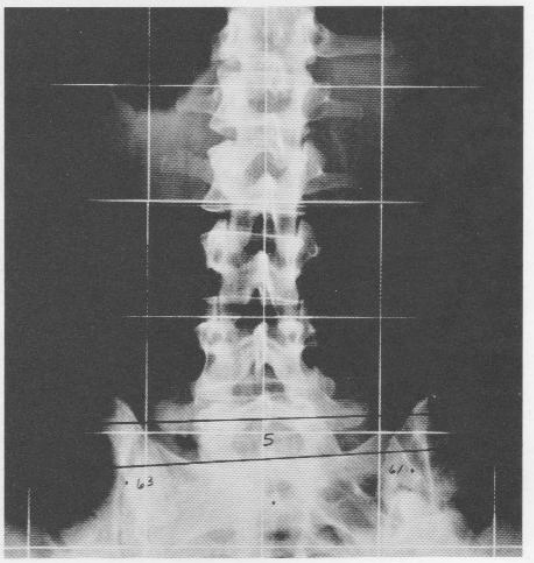


Figure 144: *Fifth Lumbar Listing, PRI-M.*



Notes

Figure 145: *Fifth Lumbar Listing, PLS-Sp.*

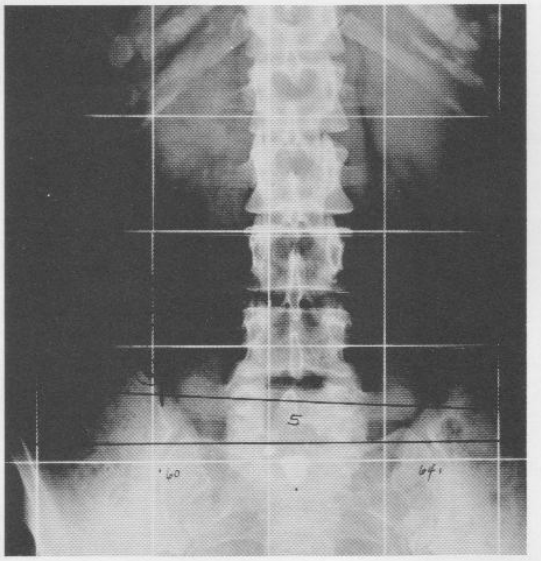
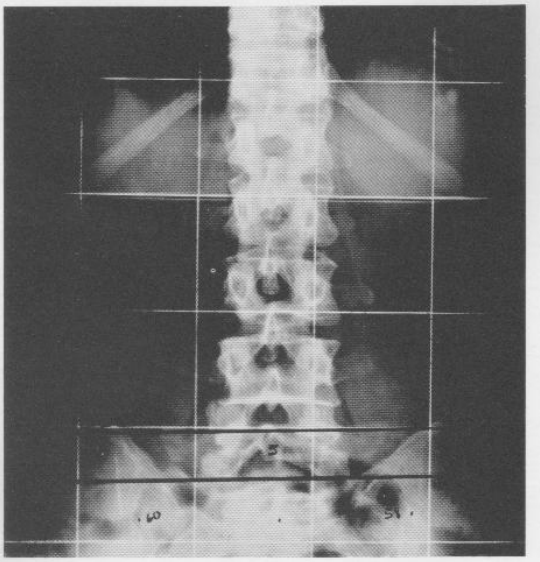
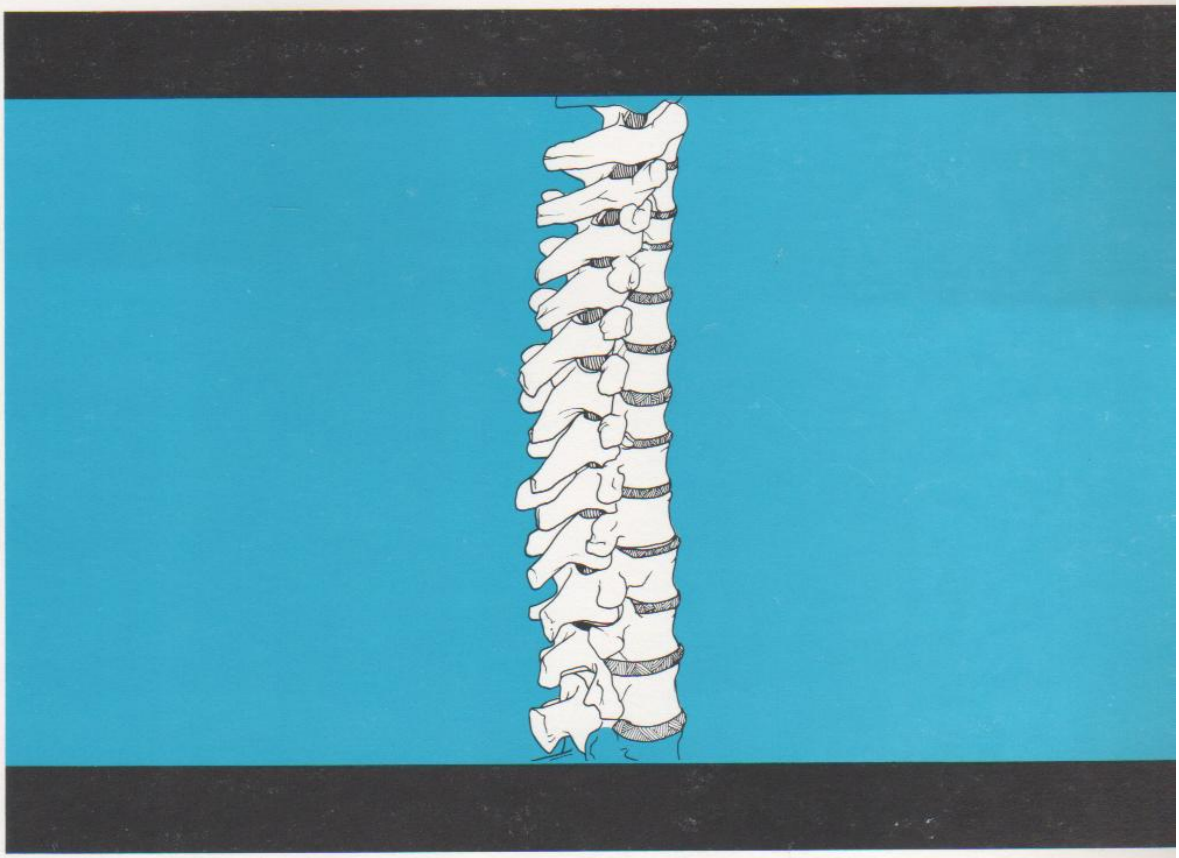


Figure 146: *Fifth Lumbar Listing, PL-Sp.*



Thoracic Misalignments

Chapter 7



Gonstead Chiropractic Science & Healing Art

Chapter 7

Thoracic Misalignments

It has long been the custom in chiropractic to list a vertebra according to the position of its spinous process, particularly with the thoracic vertebrae. A "spinous right and superior", for example, it was assumed could be repositioned by driving the spinous inferiorward and to the left. The thrust was directed with that in mind, the aim being to align the spinous with the center of its body. Frequently this was accomplished.

But all too often this is not adequate to remove the pressure on the nerve, reducing but a portion of it at best. A medial and superior-to-inferior thrust on the spinous may eliminate the rotation, but probably not the lateral wedging, and certainly not the posteriority.

To correct the subluxation completely, the segment must be moved in a posterior-to-anterior direction, *through the plane of its disc.*

The significance of thrusting through the disc may not be obvious at first, but when one considers that doing so alters the direction of thrust as much as ninety degrees, the difference becomes paramount.

In fact, we suggest that thrusting in the wrong direction may have altered the course of the profession by convincing thousands of chiropractors that "adjusting" a vertebra cannot change its position, does not get people well, and is painful to the patient.

If these were their conclusions, they would naturally pursue methods more consistent with the conventional approaches to healing, and, perhaps, with more public acceptability.

Chapter seven expalins the directions in which the thoracic vertebrae become misaligned, and how they are listed on the radiograph. In addition, it tells how the thrust corrects the various directions of misalignment when it is delivered through the plane of the disc. This applies not only to the thoracics, but to all the vertebrae, with the exception of the atlas.

The thoracic vertebrae are similar to the lumbars in that they undergo posterior misalignment, circumrotation, and lateral wedging. Reference to the direction of misalignment is always made in relation to the vertebra below.

Posteriority

When a thoracic vertebra is misaligned there is always some degree of posterior slip involved. However, when comparing the posterior margins of the two adjacent vertebral bodies on the lateral projection, the posteriority will not always be obvious. Nevertheless, some portion of the body must be posterior in order for the subluxation to occur (Fig. 148).

Figure 148: *A Subluxated Thoracic is Posterior to the Vertebra Below.*

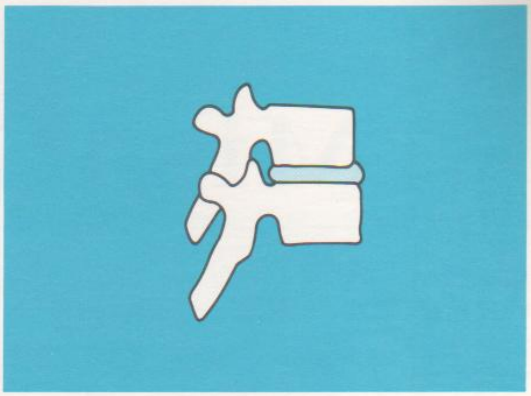
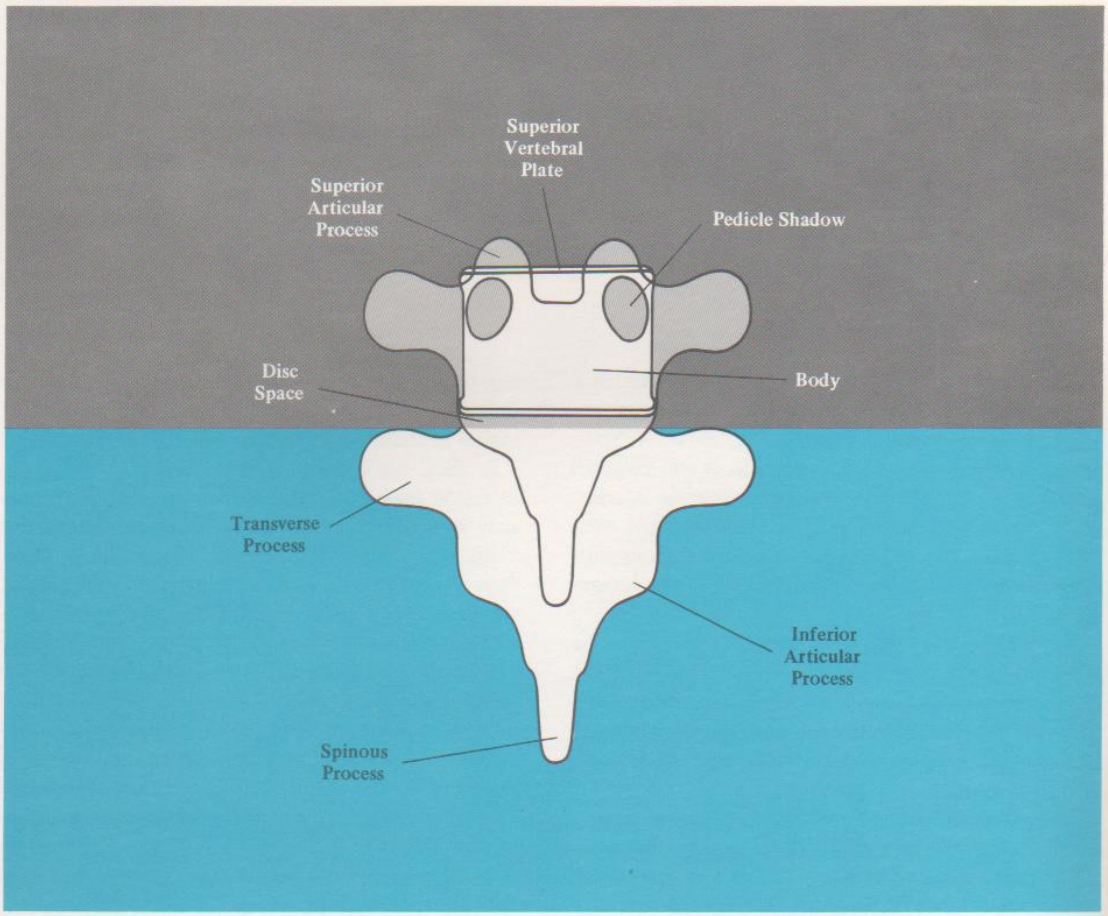


Figure 147: *Radiographic and Diagrammatic Representation of Thoracic Vertebrae.*



The thoracic vertebrae will not misalign anteriorward because of the interceptive action of the superior zygapophyses, which prevents forward displacement when comparing the subluxated vertebra with the vertebra below.

Because of the tendency of the ribs and their ligaments to bind together the thoracic spine, and the fact that the spine is normally kyphotic in the thoracic region, a thoracic vertebra will rarely show inferiority on the lateral film.

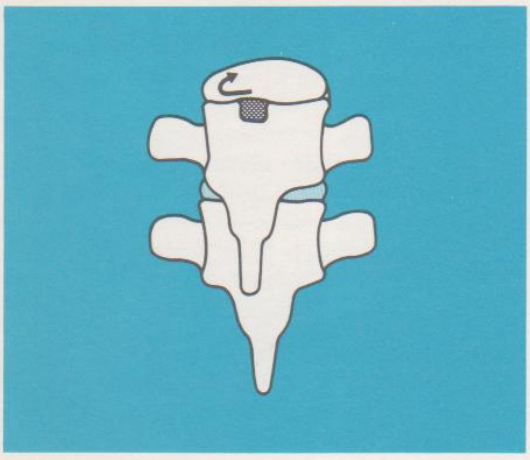
The designation of posteriority in the listing is the letter "P".

Facets Influence Motion and Misalignment

The planes of the articular processes are partly responsible for the kinds of motion predominating in each area of the spine, with rotation and lateral flexion prevailing in the thoracics, and mostly flexion and extension being permitted with the lumbars.

The planes of the facets also influence how much a vertebra tends to slip in a particular direction. Because the thoracic facets are nearly on a coronal plane, the vertebra need not move very far posteriorward before it can misalign in other directions. On the other hand, the lumbar vertebrae must slip considerably further posteriorward before they move in other directions, since their facets are on more of a sagittal plane. This accounts for generally more posterior misalignment in the lumbar spine before subluxation occurs, and less in the thoracics, although this is not always true since the movement of each segment is subject to its own individual characteristics.

Figure 149: *The Body has Rotated the Spinous Process to the Left.*



Body Rotation

When misalignment of a thoracic vertebra involves body rotation, the body circumrotates in relation to the body of the vertebra below. This turning of the body also rotates the spinous process laterally to either the left or the right side (PL or PR). Figure 149 illustrates a "PL" thoracic vertebra, although this listing is incomplete until the contact point is designated.

Lateral Wedging

Lateral wedging is present when the subluxated vertebra appears tilted on the A-P film, in relation to the subjacent vertebra. The nucleus has shifted from the center of the disc, causing the two apposed vertebral plates to lose their parallel relationship. Lines drawn through the two plates form a wedge, which corresponds with the wedging of the intervertebral disc (Fig. 150).

When the body rotates the spinous process to the open side of the wedge, the segment is listed PLS or PRS. The letter "S" signifies that the body is higher, or superior, on the same side toward which the spinous has rotated.

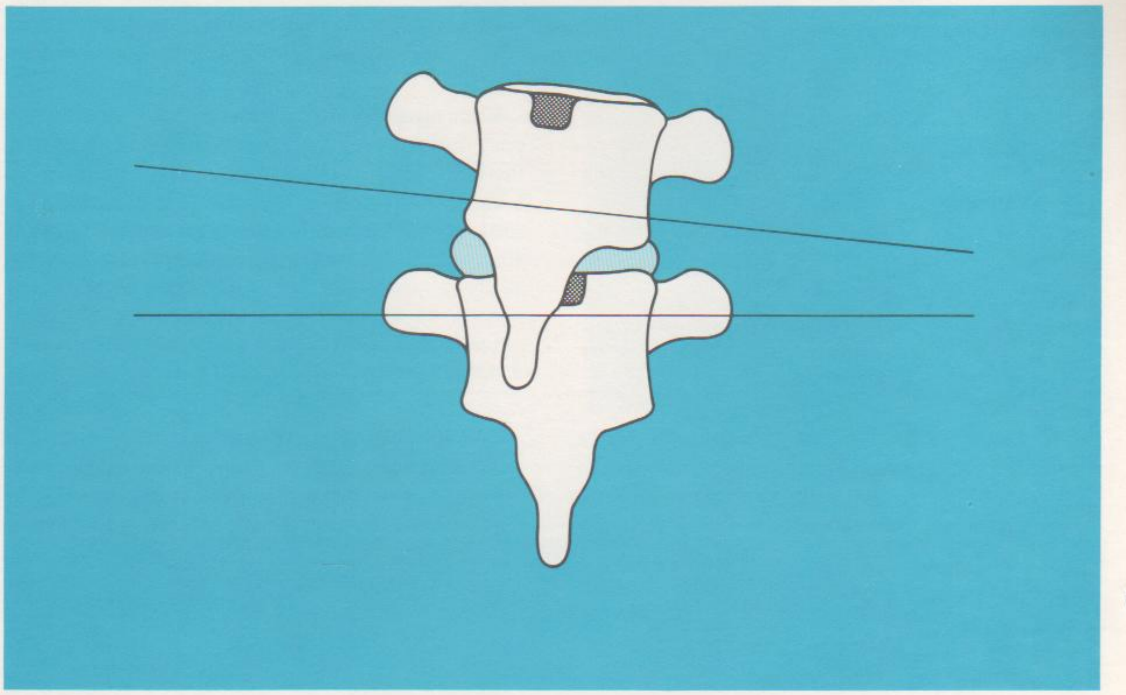
When the spinous process is rotated to the closed side of the wedge, the segment is listed PLI-T or PRI-T. The letter "I" in the listing indicates that the body is inferior on the side toward which the spinous has rotated, and the "T" stands for the transverse process, upon which the segment is contacted when the correction is made.

Since the contact point for correcting this type of subluxation differs with each section of the spine, it is stated again to emphasize correction of the throacics: *When a thoracic vertebra rotates so that the spinous process moves toward the closed side of the wedge, the transverse process on the opposite side (i.e., on the open side of the wedge) is the point of contact for making the correction.*

Figure 151 shows the four basic positions of subluxation when posteriority, body rotation and lateral wedging misalignments exist between two adjacent thoracic vertebrae.

It is interesting to note that when comparing the PRS with the PLS, or the PRI-T with the PLI-T, the two are mirror images of each other, and the posi-

Figure 150: *A Thoracic Vertebra with Lateral Wedging.*



tions of the bodies are opposite in rotation and lateral wedging. In each instance, the spinous processes are contacted for the correction, but on opposite sides.

However, when comparing the PRS with the PLI-T (or the PLS and PRI-T), the positions of the bodies are the same except for rotation. Thus, the contact points are on the same side, but on different structures.

A third possibility exists when the PRS and the PRI-T (or the PLS and the PLI-T) are compared. The contact points are not only on different structures, but are also on opposite sides. It could be said that the bodies are positioned the same except for lateral wedging.

Visualizing these various combinations fosters one's total understanding of vertebral subluxations, and allows one to better comprehend what he is trying to accomplish by the corrective thrust.

Misalignment Without Wedging

Whenever a thoracic vertebra is misaligned with posteriority and body rotation, but without lateral wedging, one of the following conditions is found:

1. The planes of the two bodies will be parallel, and there will be no scoliosis in the thoracic spine where the subluxation exists, in which case the spinous process is the contact point and the listing is PL-Sp or PR-Sp.
2. The planes of the two bodies are parallel, but the subluxation exists within a scoliosis. The spinous has rotated to the *convex* side of the curvature, and so it remains the contact point, and the listing is still PL-Sp or PR-Sp.
3. The planes of the two bodies are parallel and the subluxation exists within a scoliosis, but the spinous has rotated to the *concave* side of the curvature. This causes the transverse process on the opposite side to be the contact point, that is, on the convex side of the scoliosis, and the listing becomes PL-T or PR-T.

The characteristics of the thoracic listings are summarized in figure 152. It is possible for a thoracic vertebra to be "straight posterior", that is, with posteriority only. However, this is quite rare.

Figure 151: *The Four Basic Positions of Subluxation Involving Posteriority, Body Rotation and Lateral Wedging.*

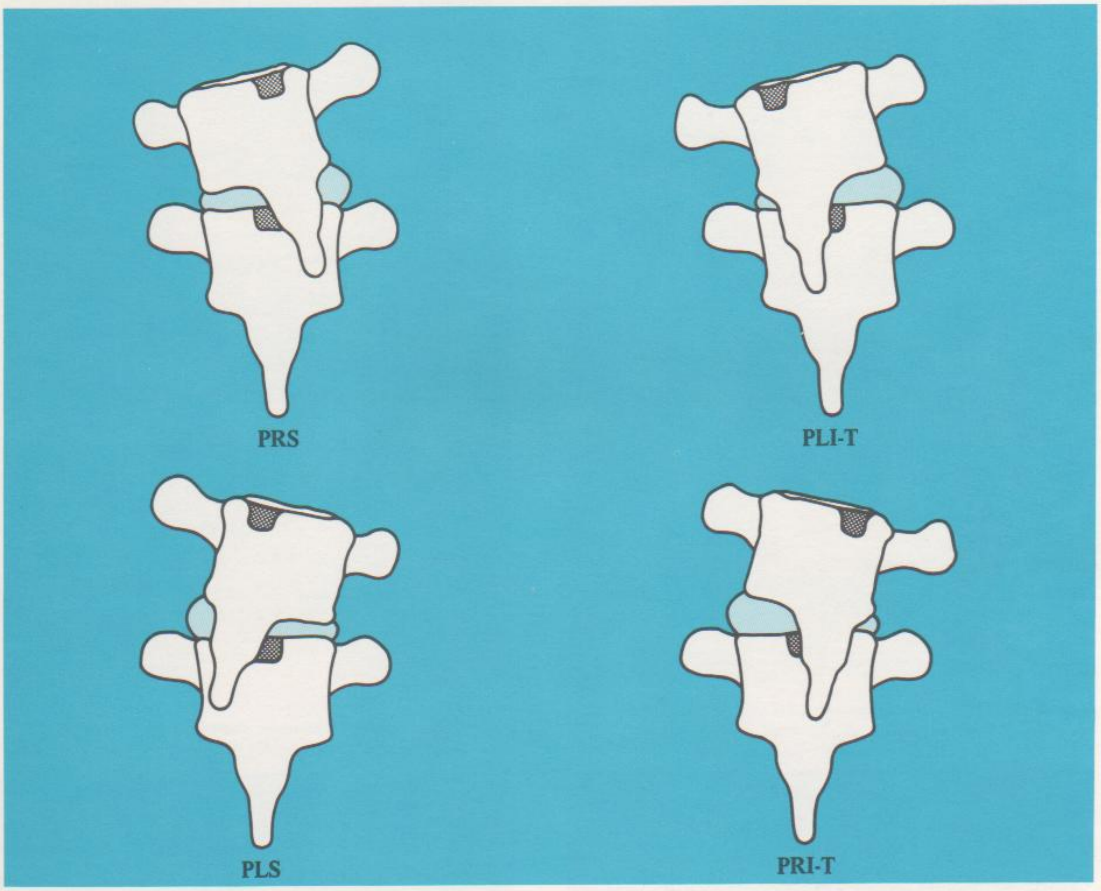


Figure 152: *The Thoracic Listings.*

LISTING	POSTERIORITY	ROTATION	OPEN WEDGE	SCOLIOSIS	CONTACT POINT
T1-T12					
P	Yes	None	None	May Be Either	Spinous
PR-Sp	Yes	Right	None	May Be Right	Spinous
PRS	Yes	Right	On Right	May Be Right	Spinous
PRI-T	Yes	Right	On Left	May Be Left	Left Transverse
PR-T	Yes	Right	None	On Left	Left Transverse
PL-Sp	Yes	Left	None	May Be Left	Spinous
PLS	Yes	Left	On Left	May Be Left	Spinous
PLI-T	Yes	Left	On Right	May Be Right	Right Transverse
PL-T	Yes	Left	None	On Right	Right Transverse

Analyzing the Film

The analysis of the thoracic portion of the radiograph is done similarly to the lumbar spine. After it has been determined which vertebrae are involved by finding the subluxations on the patient, the doctor turns to the A-P film to find out how to make the corrections.

Since posteriority is always assumed, it need not be confirmed on the lateral view. However, it is always wise to observe the disc space so the A-P wedging, if any, and the amount of disc degeneration can be inspected.

Body rotation is determined by examining the pedicle shadows. The shapes of the thoracic spinous processes are far too variable to be reliable as an index of rotation. As the body rotates the spinous process laterally to the left or right, the pedicle shadow on that side becomes more narrow, and projects further into the lateral margin of the body. The image of the contralateral pedicle widens, and is displaced toward the mid-line of the centrum. In figure 153 the pedicle shadows have been outlined to illustrate their changes in shape with "PR" rotation (sixth thoracic, PRS; tenth thoracic, PRI-T).

It must be remembered that the rotation of the subluxated vertebra must be compared with the subjacent vertebra, and not just listed without regard to the rotation of the structures below. Therefore, the direction of rotation must be ascertained through the most careful comparison of the two upper and lower pedicles.

Lateral wedging is determined the same as it is in the lumbar spine. Lines are drawn which depict the planes of the two adjacent vertebral bodies to determine wedging of the disc (Fig. 153). The superior or inferior vertebral plates, or the upper or lower borders of the pedicle shadows may be used to represent the body plane lines. However, when the bodies are malformed, the vertebral plates bordering the disc would be most representative. The plane lines are never drawn through the disc space itself, as this may impair the view of the disc.

Figures 154 through 163 show typical misalignments found in the thoracic spine. The degree of misalignment may be great or slight, and is not indicative of the severity of the condition.

Figure 153: *The Pedicle Shadows Become More Narrow on the Side of Spinous Laterality: T 6, PRS; T 10, PRI-T.*

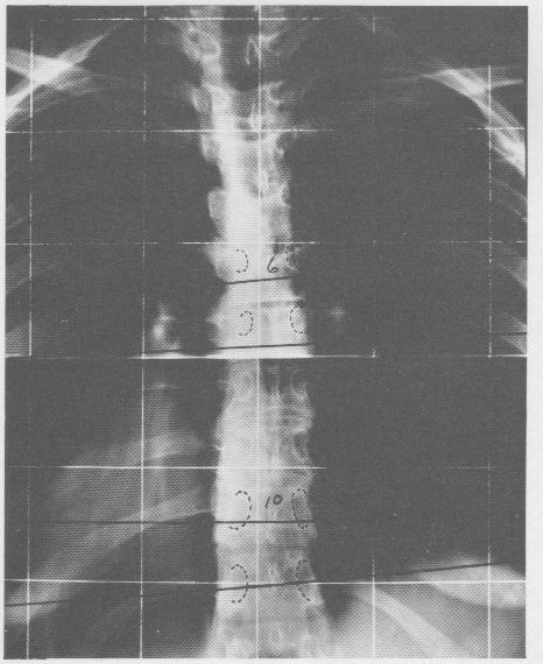


Figure 154: *Second Thoracic Listing, PLS; Sixth Thoracic, PLI-T.*

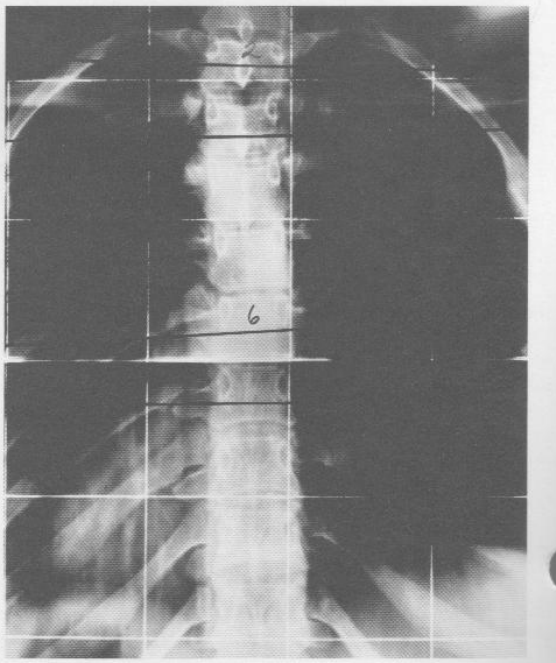


Figure 155: *Third Thoracic Listing, PRI-T; Ninth Thoracic, PLI-T.*

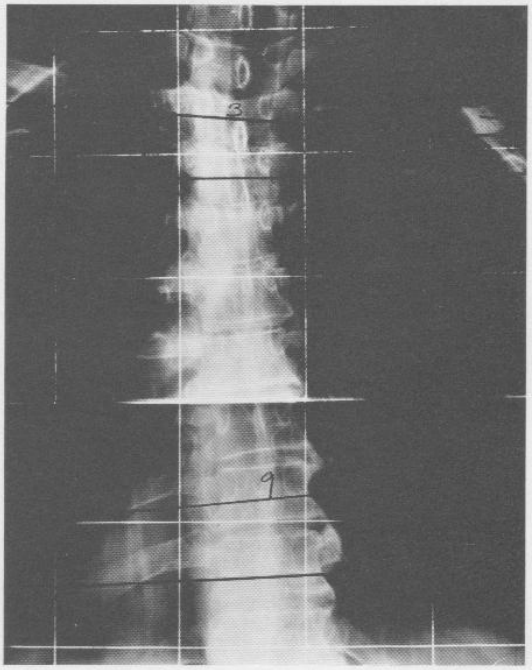


Figure 156: *Fourth Thoracic Listing, PLS; Twelfth Thoracic, PRI-T.*

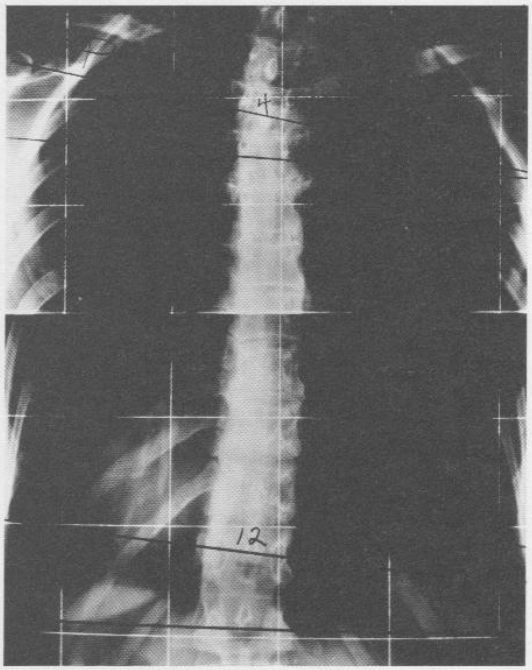


Figure 157: *Second Thoracic Listing, PLS.*

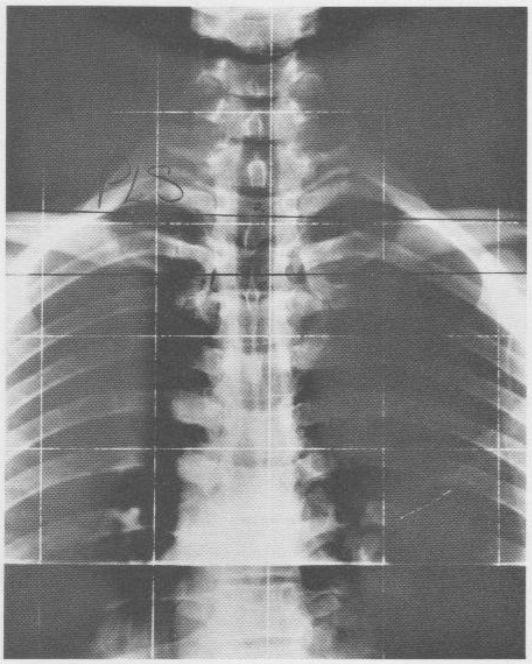


Figure 158: *Fifth Thoracic Listing, PRS.*

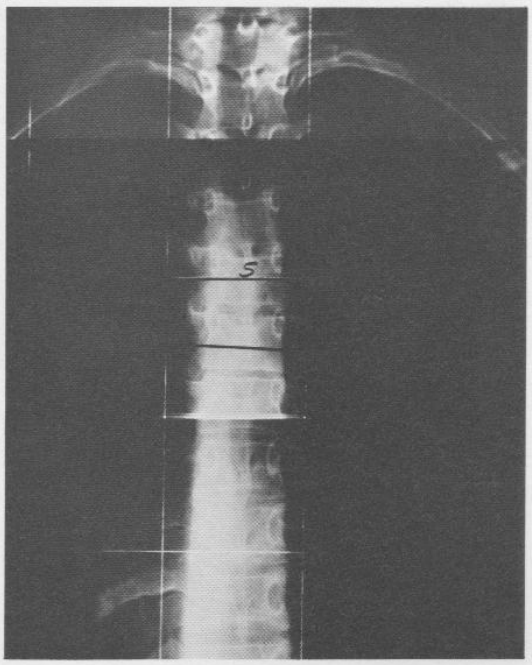


Figure 159: *Sixth Thoracic Subluxation With No Lateral Wedging, Listed PR-Sp.*

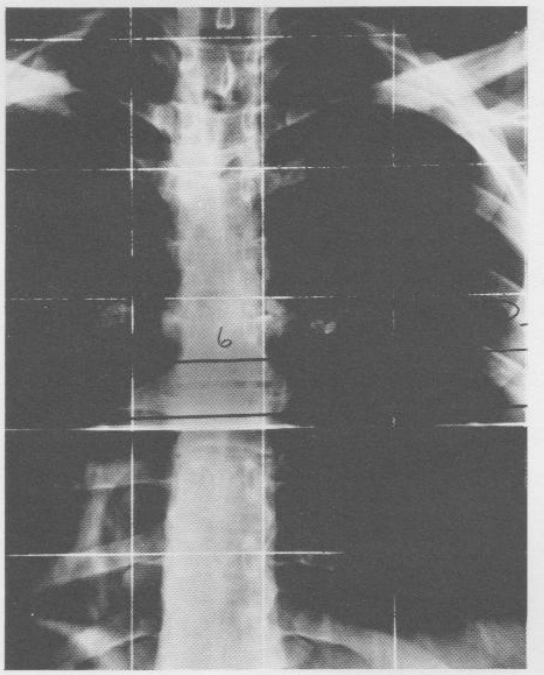


Figure 160: *Eighth Thoracic Subluxation Without Lateral Wedging but Within a Scoliosis, Listed PL-T.*

Figure 161: *Ninth Thoracic Listing, PRI-T.*

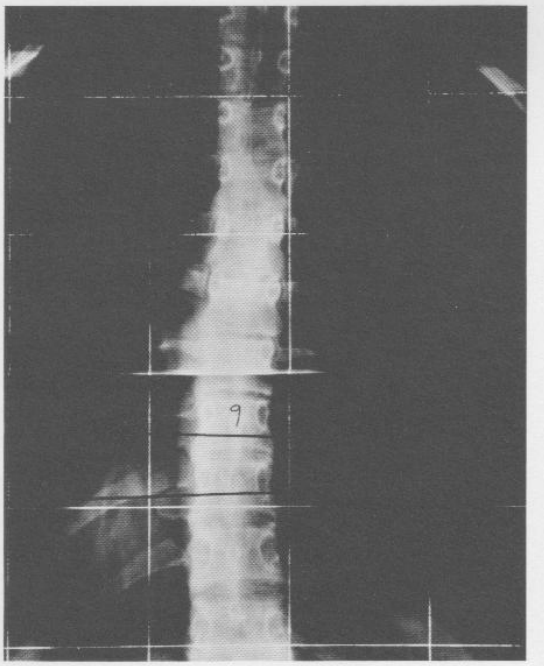


Figure 162: *Child's Film Showing Ninth Thoracic Listed PLS.*

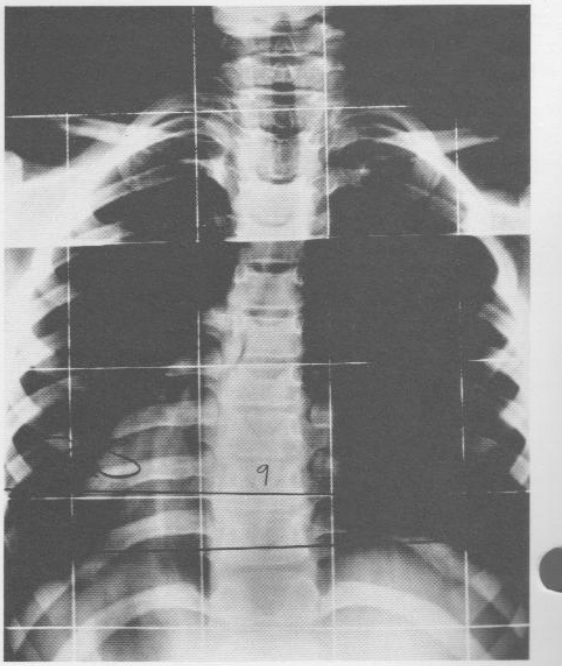
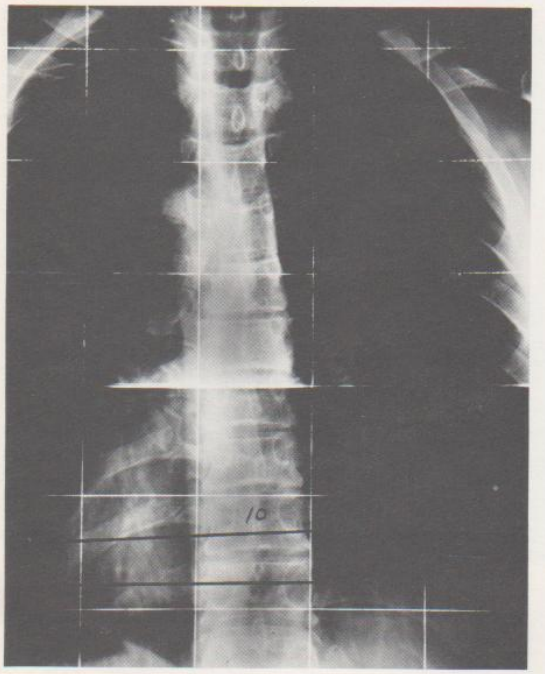


Figure 163: *Tenth Thoracic Listing, PRS.*



Repositioning the Vertebra

The object of the thrust is to reposition the vertebra toward its optimal relationship with the vertebra below by reversing its direction of misalignment. This section of the chapter will explain the general principles of how the thrust repositions the vertebra when posteriority, body rotation, and lateral wedging are involved. It is not intended as a comprehensive explanation of how the various subluxations are corrected, for this will follow in later chapters.

Correcting Posteriority

When correcting the vertebra for posteriority, the thrust must be made in a P to A direction, through the body of the vertebra, precisely in line with the plane of the intervertebral disc (Fig. 164). Since it is the body of the vertebra which has become subluxated, the main effect of the thrust must be to *reposition the body.*

The thrust must not be directed in such a way that emphasis is placed on repositioning the spinous process. With a PRS, for example, the spinous appears superior on the right side. If the right rotation and superiority of the *spinous* is emphasized in the mind of the doctor, the thrust will probably be directed too far laterally, and with too much inferiority. With such a thrust the force will not move the body to correct the posteriority or lateral wedging (Fig. 165).

The same can be said about attempting to correct an inferior spinous or a superior transverse, etc., with a thrust that is not directed through the disc.

Figure 164: *To Correct Posteriority, Thrust P to A, Through the Body, in Line With the Disc.*

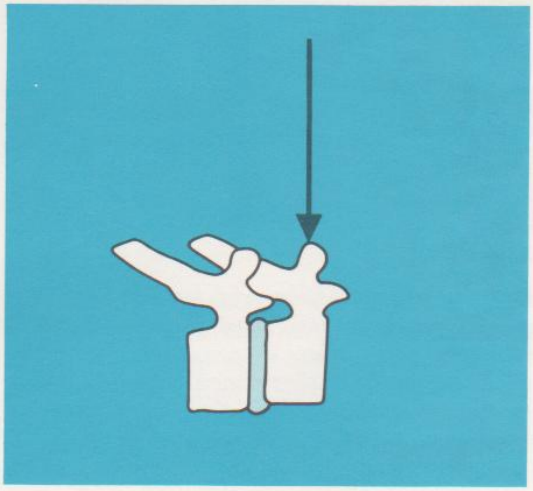


Figure 165: *The Wrong Direction of Thrust With a PRS Listing.*

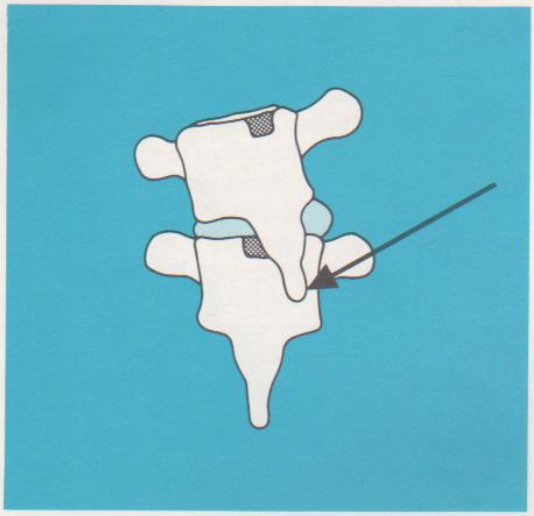


Figure 166: *The Contact is Too Far Below the Vertebral Body, Binding the Disc Fibers.*

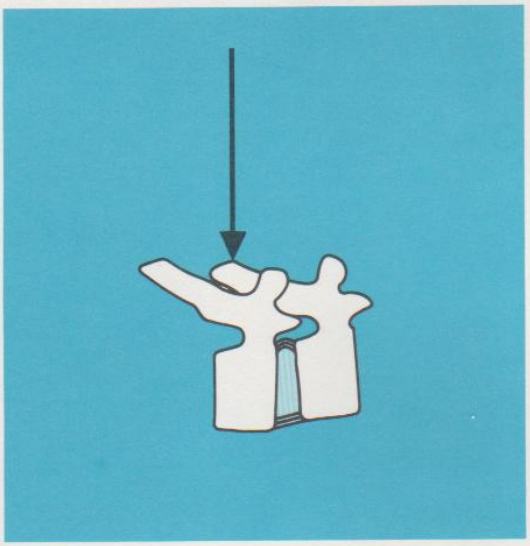
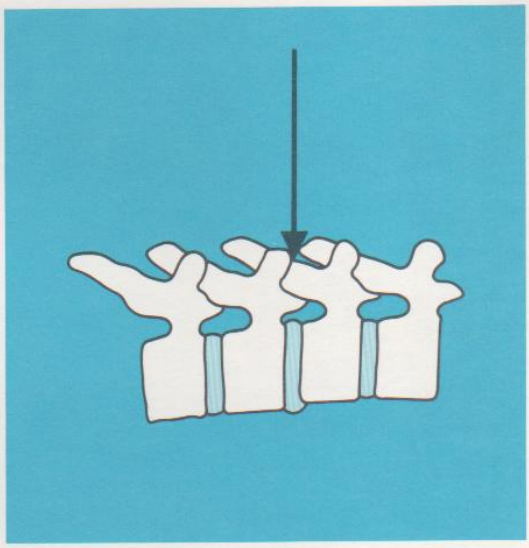


Figure 167: *Contact the Spinous as Close to the Body as Possible.*



Because the spinous processes of the mid-thoracic vertebrae extend inferiorward, and below their own bodies, a spinous contact may not be made directly above the body. If the tip of the spinous is contacted, the thrust will probably bind the fibers of the disc, or other ligaments, and the vertebra will be difficult to move. In addition, such a directed force would be painful to the patient.

Figure 166 illustrates a P-A thrust applied to the tip of the spinous. Not only do the fibers bind, but the annulus may bulge back into the neural foramen or canal, traumatizing their contents.

To properly move such a vertebra, the spinous must be contacted as far superiorward as the imbricating spinous above will allow. Figure 167 shows the contact point so that the thrust can be applied directly through the disc, and as close to the body as possible.

The direction of thrust always follows the plane of the disc, and must be modified according to which area of the spine is being corrected. The direction must also be adapted to the contour of the patient's spinal curve. These vary considerably between persons, as with an extremely kyphotic thoracic spine, or a loss of lordosis in the cervicals.

By examining the lateral film in the horizontal position, the doctor can see how the P-A direction of thrust must be altered to conform to the individual's contours (Fig. 168).

Correcting Body Rotation

Body rotation is corrected by directing the thrust from the lateral contact point (spinous or transverse) toward the center of the vertebral body. In addition, the thrust is also directed *through the plane of the disc.* Thus, the body rotation and posteriority are corrected simultaneously.

In figure 169, notice how the same general direction of thrust is applied for the PR-Sp, PRS, PL-T and PLI-T, the only differences being slight modifications for the degree of rotation. The spinous process of the PR-Sp or the PRS, and the transverse process of the PL-T or the PLI-T, are all moved P to A, and from the right to center.

Correcting the Lateral Wedge

Lateral wedging is corrected by a torquing action which is a part of the thrust, but applied at the end of it. In other words, as a continuation of the same thrust which corrects the rotation and posteriority, the contacted structure is "torqued" to close the open side of the wedge. Note: This is the force which corrects the apparent superiority or inferiority of the spinous, transverse, etc.

Figure 168: *The Direction of Thrust Follows the Plane of the Disc and Conforms to the Curve of the Spine.*

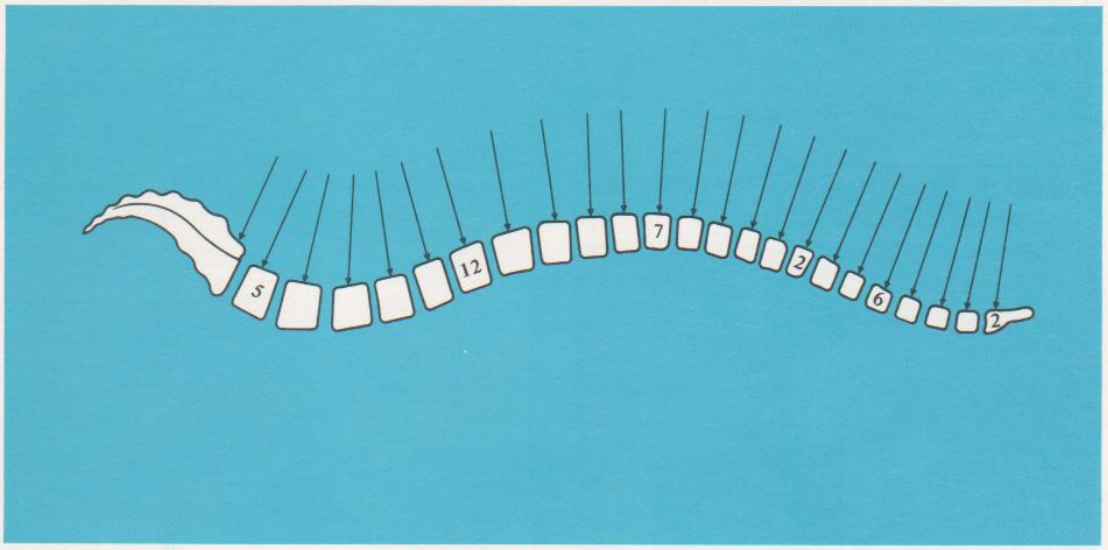


Figure 169: *Body Rotation is Corrected by Thrusting Ventromedially, Through the Vertebral Body.*

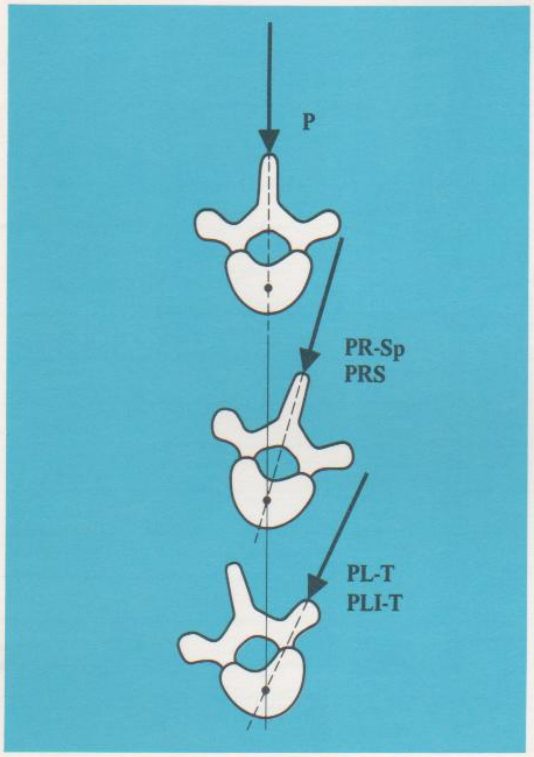
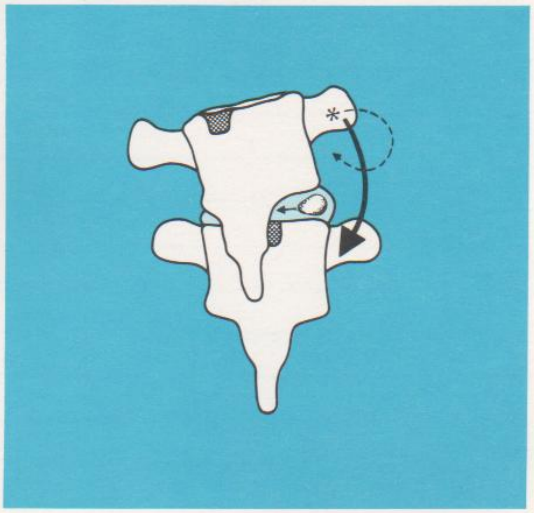


Figure 170 shows the superior side of the body on a PLI-T subluxation being torqued inferiorward, closing the wedge, and forcing the nucleus toward the center of the disc. The thrust is applied on the right transverse process and is directed through the disc, P to A, and from the right toward center. This is illustrated in the bottom picture of figure 169.

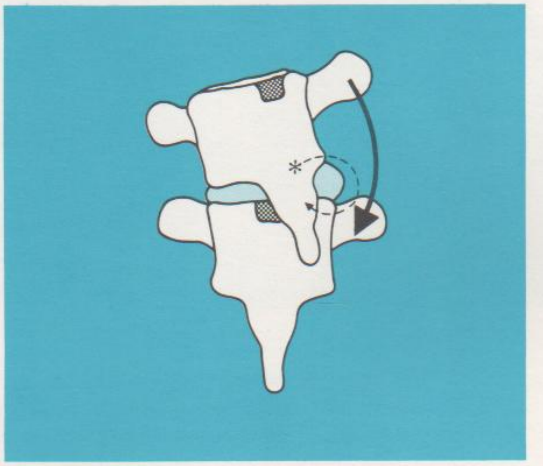
Figure 170: *"Torquing" the Body Inferiorward With a Transverse Contact.*



In figure 171, the superior side of the body is being torqued closed with a spinous contact. The direction of thrust is the same as for the vertebra in figure 170, and is illustrated in the middle drawing of figure 169.

These rules covering the direction and motion of the thrust pertain not only to the thoracic vertebrae, but to the lumbars and cervicals as well.

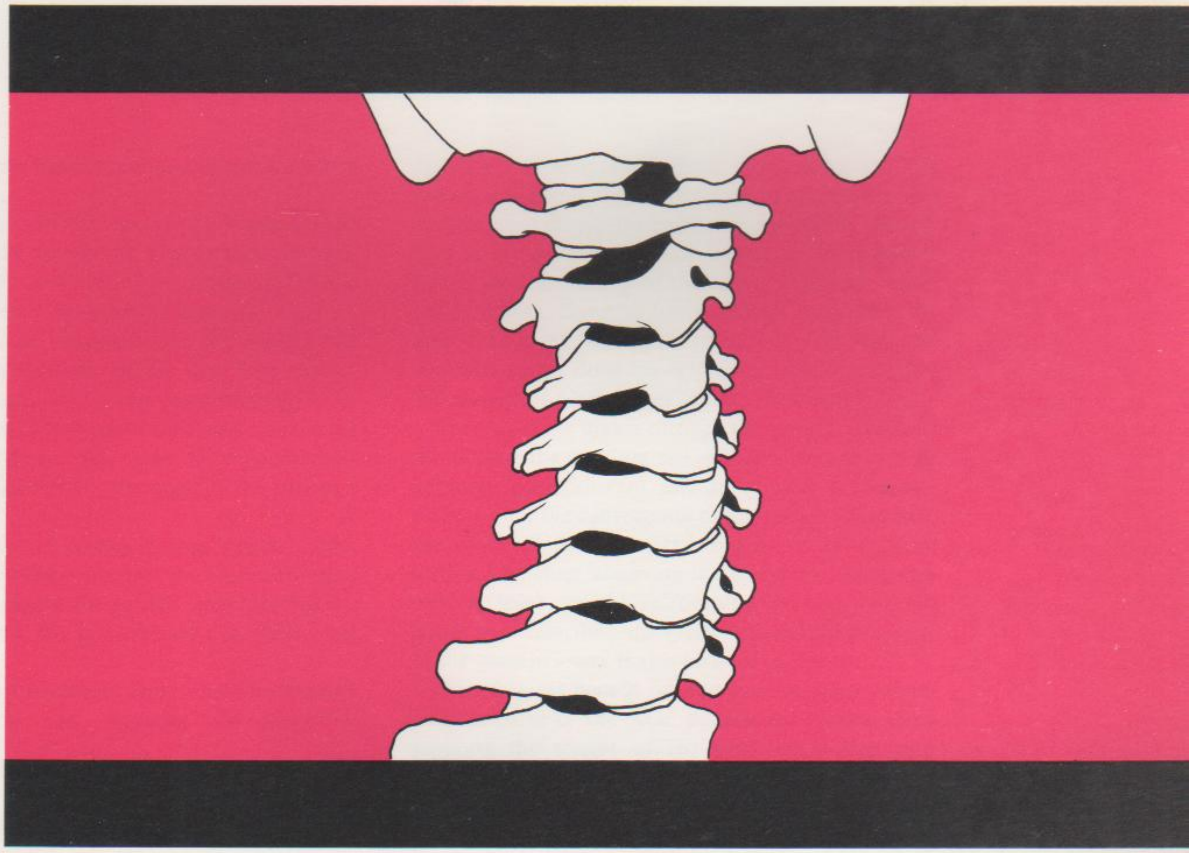
Figure 171: *"Torquing" the Body Inferiorward With a Spinous Contact.*



Notes

Cervical Misalignments C2 Through C7

Chapter 8



Gonstead Chiropractic Science & Healing Art

Chapter 8

Cervical Misalignments C2 Through C7

Chapter eight describes cervical misalignments below the atlas vertebra.

When a cervical vertebra becomes subluxated, the entire segment will usually slip inferiorward, in addition to any other direction of misalignment. This is readily observable on the lateral radiograph.

But these inferior misalignments are seldom the most conspicuous findings on the film. One's attention is usually captured by the compensating vertebrae, which are so often more obviously misaligned than the subluxations. As a result, compensations are commonly mistaken for the cause of the patient's condition.

Attempts to correct compensations will be futile, for they will neither restore the cervical spine structurally, nor relieve the patient symptomatically. Only by correcting the subluxations can these aims be accomplished.

All such cases of mistaken identity can be avoided by understanding and applying the following information.

Optimal Cervical Alignment

When there is optimal alignment between each of the adjacent segments of the cervical spine, the contour of the bodies will form a uniform lordotic curve, as illustrated in figure 173. This curve, the normal cervical lordosis, is formed because of the shape of the vertebral bodies. Between the bodies are the "parallel" intervertebral discs. Commonly, on the lateral radiograph, the vertebral plates may not appear parallel, even though the bodies are completely aligned. This is due to the posterior lipping of the adjacent bodies, and to overlap of the lateral interbody joints (of Luschka). However, on a distinct x-ray film, the disc boundaries will appear parallel by following the vertebral plates along the epiphyseal lines. (Naturally, this statement presupposes perfect alignment.)

When lines are drawn through like points of each of the bodies, the *lines* are not parallel. Instead, they all converge posteriorward and meet near a common point. (Since the convergence of the lines is so gradual, the point where they meet is not shown in the illustration.) Whether observing the contour of the entire cervical spine, or the relationship between two adjacent segments, the lengthy lines extend the positions of the parts in a way that is obvious to the eye.

There is great benefit derived from having a normal lordotic curve of the neck. Because the cervical spine supports the weight of the head, every step, and especially every misstep, causes a shock to the discs. The forward curve adds flexibility to the neck so that, through its springing action, much of the jarring is absorbed. When the forward curve is diminished or lost (hypolordosis), every jolt is transmitted through the spine, and the discs alone are left to absorb the full force.

A perfectly aligned cervical spine is rarely found. There are numerous ways in which its normal contour can be altered, the most common of which is through compensation.

Cervical Compensatory Changes

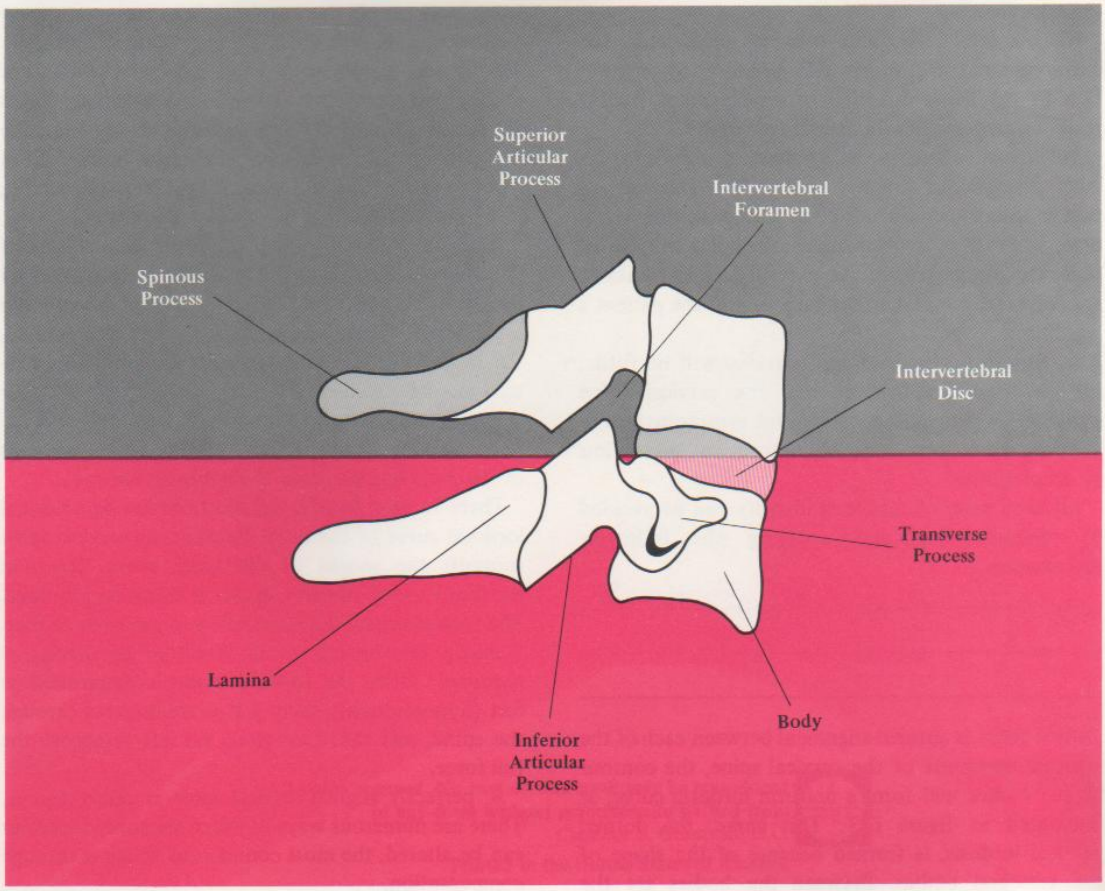
The cervical spine is very subject to compensatory changes. When a subluxation occurs outside the cervical area, adaptations must usually be made. As postural shifts occur to overcome the pull of gravity and to maintain body balance, the arrangement of the cervical spine must be modified, the objective being to keep the head in a "neutral" position.

A neutral head position may be described as one with the head placed in the middle position around each of its axes of motion. That is to say, there would be no flexion or extension (transverse axis), no head rotation (vertical axis), and no lateral bending (antero-posterior axis). This is a protective mechanism, for with the head in this position, the individual is most able to detect and react to changes which affect his balance, and therefore, his well-being.

The vestibular apparatus of the inner ear, as well as the visual and proprioceptive systems, apprise the brain of the position of the head so that appropriate changes can be made to bring it into a neutral position. This is similar to the way the righting and attitudinal reflexes correct for the sudden shifts in position or tone that affect static and dynamic equilibrium. However, those are quick adaptations to brief changes. Here we are considering the more prolonged postural alterations that result from subluxations.

In addition to subluxations, other conditions causing protracted postural changes are abnormal weight distribution, developmental anomalies, fractures, and other injuries. All of these are likely to produce alterations in the normal lordosis.

Figure 172: *Lateral Radiographic and Diagrammatic Representation of Cervical Vertebrae.*



Compensation will change the normal lordotic curve in various ways. As seen from a lateral radiograph, the curve may be increased (hyperlordosis), in which case the converging lines will meet at a point closer to the spine (Fig. 174). Or, compensation may cause all the lines to *diverge* posteriorward, and converge toward the anterior. Such a spine would not only have lost its anterior curve, but would curve backwards, producing a cervical kyphosis (Fig. 175). More typically, though, a compensating cervical spine will show features of both extremes, with the lower lines converging, the upper ones diverging, and the overall lordosis reduced (Fig. 176).

So far, we have been discussing compensatory changes in the cervical spine that result from extracervical subluxations, or other influences outside the cervical area. In addition, we said that figure 176 may be typical of such a compensating spine. But figure

Figure 174: *Hyperlordotic Cervical Curve Due to Compensation. The Lines Converge Close to the Bodies.*

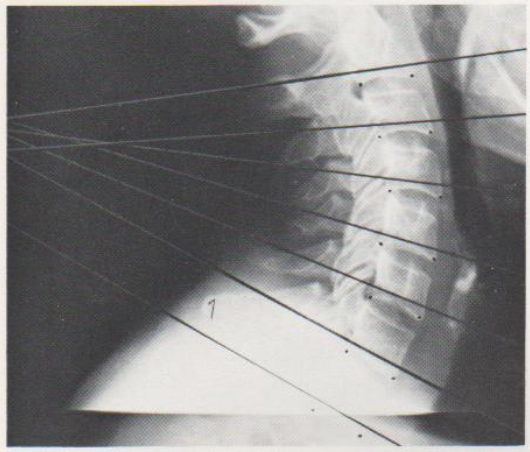


Figure 173: *The Normal Lordotic Cervical Curve. Lines Through the Bodies Converge Posteriorward.*

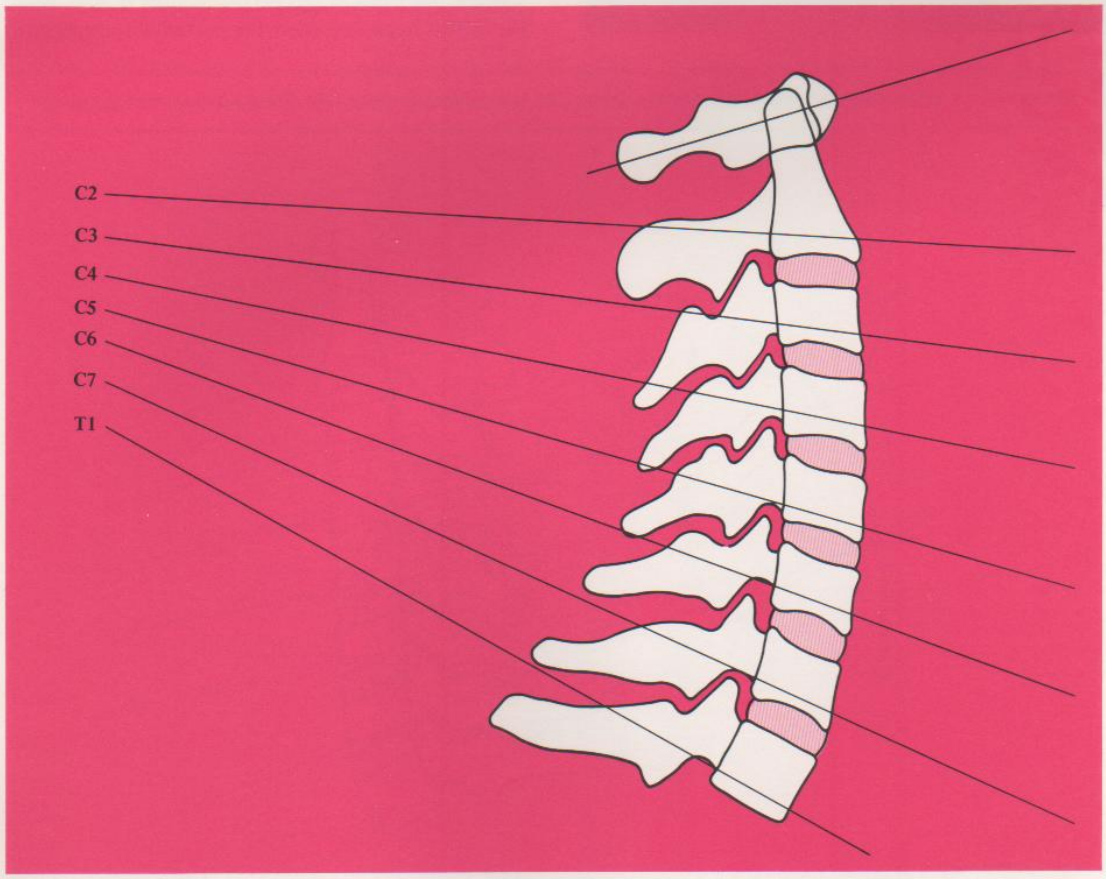


Figure 175: *Kyphotic Cervical Curve Due to Compensation. The Lines Diverge Posteriorward.*

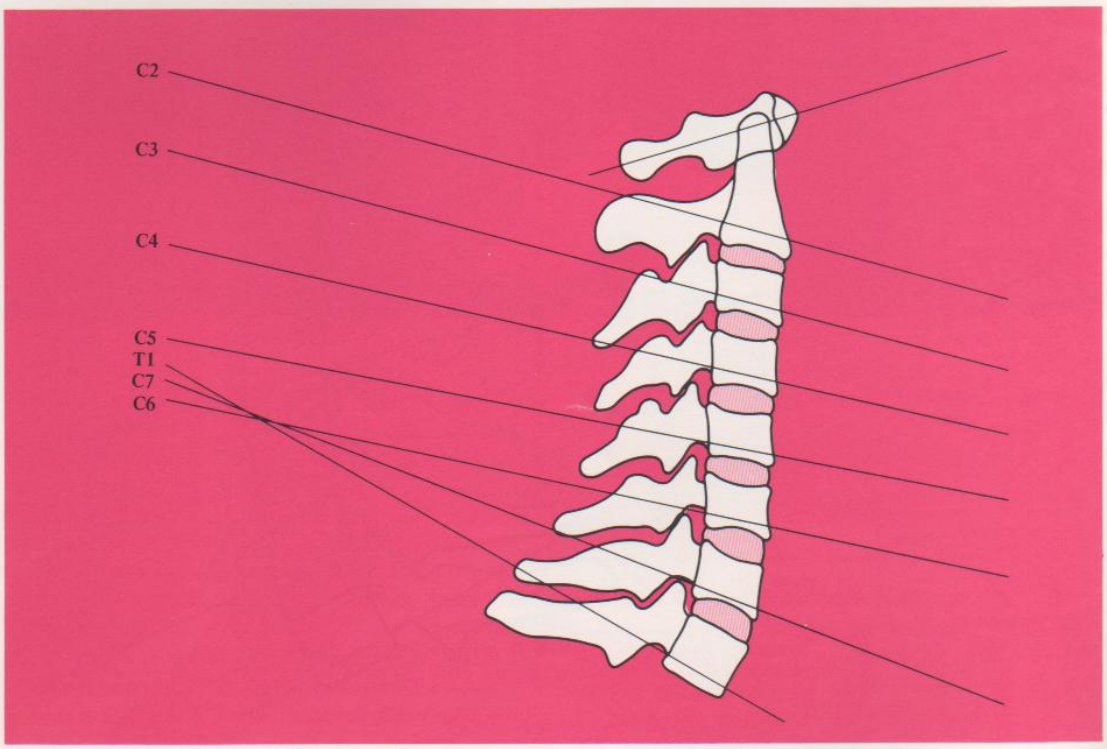
176 is also typical of a spine that is compensating for a subluxation *within the cervical spine itself.*

Mechanism of Misalignment

It has been stated in previous chapters that subluxations are traumatically produced. The cervical spine is especially subject to trauma because it supports the head. Due to the head's inertia and momentum, the neck is often subjected to backward and forward flagellation forces; hence, the term, "whip-lash". But to produce subluxations, the forces need not be so severe as those commonly associated with automobile collisions. Even an unguarded step off a curb or a sneeze can precipitate a problem. Often, such a minor force will be all that is necessary to subluxate a vertebra that has already been misaligned due to compensation.

When the head is forced backwards, that is, when the neck is hyperextended, the posterior arches absorb

Figure 176: *A Typical Compensating Hypolordotic Curve. The Lower Lines Converge; the Upper Lines Diverge.*



much of the force. The discs themselves are not usually injured (Fig. 177). The result may be strain, sprain, or even fracture, possibly, but not subluxation. (However, the atlas and condyle are often subluxated from hyperextension forces.)

Most cervical subluxations are the consequence of the head being driven *forward*. As the spine is hyperflexed, the bodies approximate along their anterior edges, and a force is transmitted through the segments, driving them posteriorward and inferiorward (Fig. 178). Usually, one segment will receive more of the impact, resulting in it being the subluxation. When the force is sufficiently strong, the bodies will be "notched" on their anterior edges, due to the compression of their anterior rims (Fig. 179).

Many times, the flexion force is severe enough to injure the disc *above* the subluxated vertebra. The greatest damage usually occurs in the front of the disc where the point of impact is, and predisposes it to subsequent lipping and spurring. This disc will eventually undergo degeneration, just as the disc below will, if the subluxated vertebra is not corrected (Fig. 180).

Figure 177: *A Hyperextended Cervical Spine.*

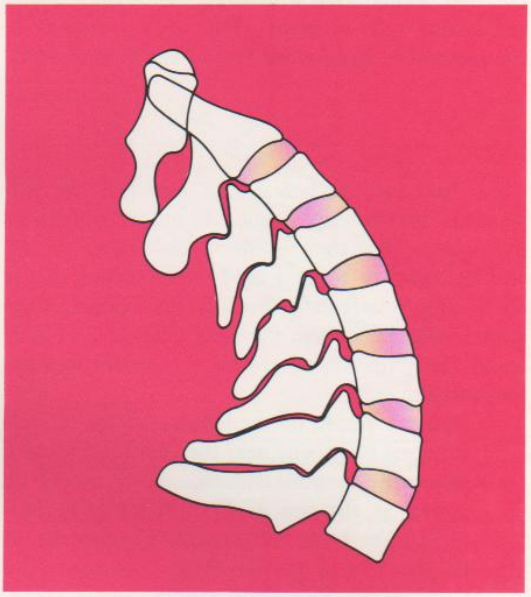
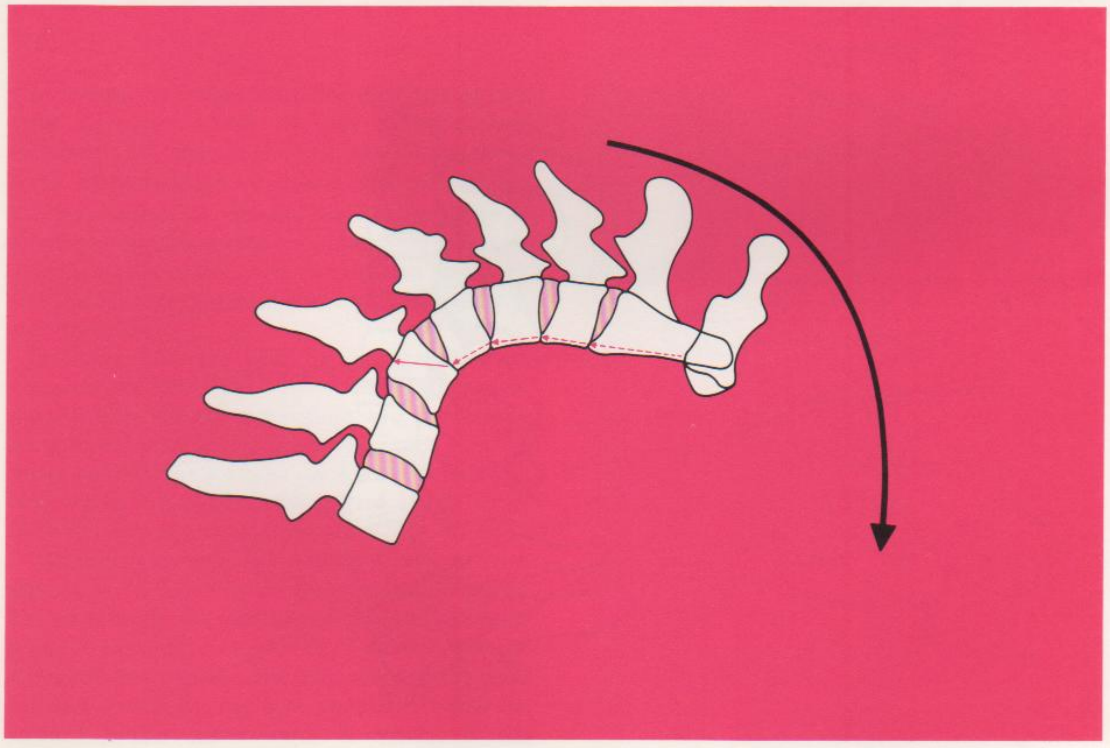


Figure 178: *A Hyperflexed Cervical Spine. One of the Segments is Driven Posteriorward and Inferiorward.*



On occasion, the hyperflexion is compounded with a violent blow to the head, an unfortunate concatenation that occurs often with diving into shallow pools, and similar such accidents. This often results in a compression or avulsion fracture of one of the bodies.

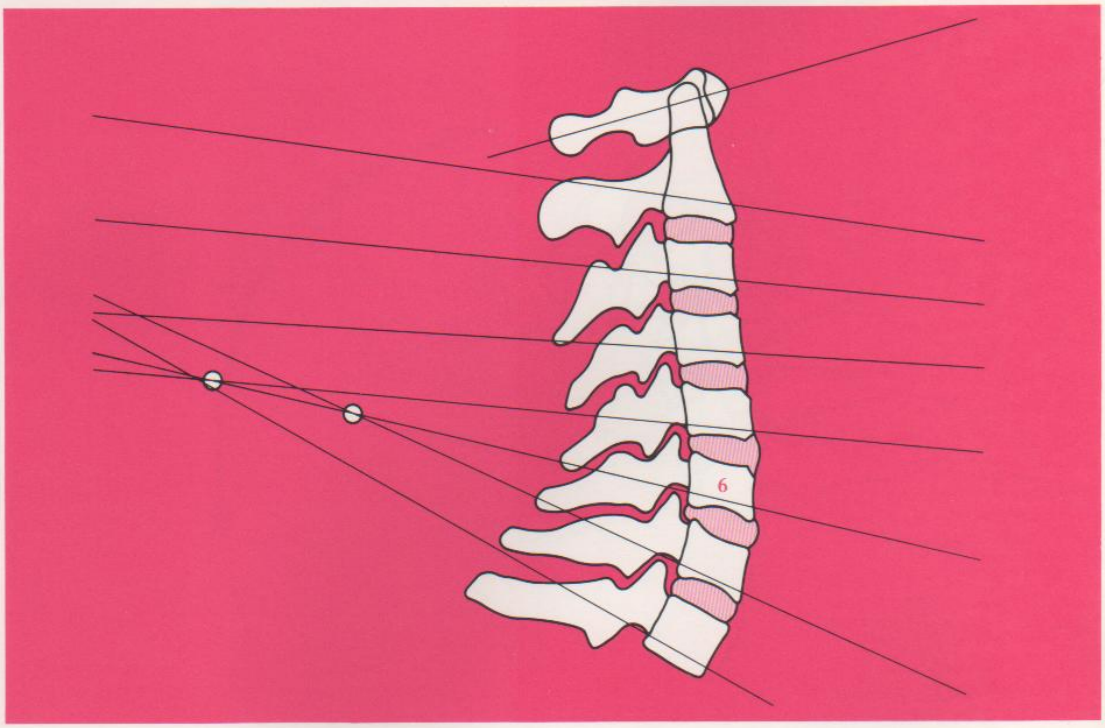
Drawing the Lines

The lines on the lateral film represent the A-P planes of the vertebral bodies. In order for them to give a true indication of the overall curve of the cervical spine, or to be a valid representation of the relationship between any two adjacent segments, they must be drawn through the same exact area of each body. The following procedure is recommended for the most accuracy:

1. Dots are placed on the inferior border of each vertebral body, one near the anterior edge, and one near the posterior edge. They should be placed at the tips of the inferior body projections, as shown in figure 181. The dots should be placed on all the segments, from axis to the first thoracic, before any lines are drawn.

Figure 180: *Degeneration of the Disc Above the Subluxation. Lipping where Damage Occurred From Impact. Notice Compression and Notching of Bodies Above.*

Figure 179: *Bodies Compressed, or "Notched", From Severe Hyperflexion. Fifth Cervical Disc Damaged From Impact. Sixth Cervical is More Inferior Than Fifth Because Its Line Crosses Closer to Bodies (Circles).*



2. The leading edge of the parallel should be aligned with the two dots on each vertebra. The parallel should be moved upwards so the leading edge is above the disc space, but still within the lower area of the body. The lines should be drawn the full length of the leading edge, *particularly extending them posteriorward,* behind the vertebra. Note: The dots may have to be lined up on the right side of the parallel's leading edge, so more of the line can be drawn *behind* the vertebra.

Interpreting the Lines

Figure 181 represents a segment optimally aligned with the vertebra below. The disc is parallel, and the lines converge posteriorward just slightly.

In figure 182, the upper vertebra is misaligned with posterior and inferior misalignment. The inferiority is indicated by the increased convergence of the lines, as shown by their crossing near the spinous processes. *The greater the degree of inferiority, the closer to the posterior border of the bodies the two adjacent lines will intersect.*

When comparing the amount of inferiority of one segment with that of another segment, the one with the lines crossing closer to the bodies has the greater degree of inferiority.

In making the comparisons, one must be sure he is using the points where the lines of two *adjacent* vertebrae cross, and not the crossing of a line two or three segments below. In figure 179, for example, the only points of crossing that are indicative of inferiority are the circled ones. The other line intersections are not points where two adjacent lines cross, and therefore do not signify increased inferiority of any vertebrae.

In figure 183, the lines diverge posteriorward. *Whenever the lines on the lateral film diverge toward the posterior, and converge anteriorward, the vertebra being represented by the upper line is in a compensatory position.* The posterior portion of the vertebral body will have misaligned superiorward, and the entire body will have slipped anteriorward.

Normally, the facets will prevent a vertebra from slipping so far anteriorward that subluxation results. But occasionally the misalignment *will* produce nerve pressure. However, *a vertebra in an anterior compensating position should never be adjusted, for to do so will only irritate the disc more, and possibly drive the segment further anteriorward.* A vertebra in this

Figure 181: *An Optimally Aligned Segment. There is Slight Convergence of Lines Toward the Posterior.*

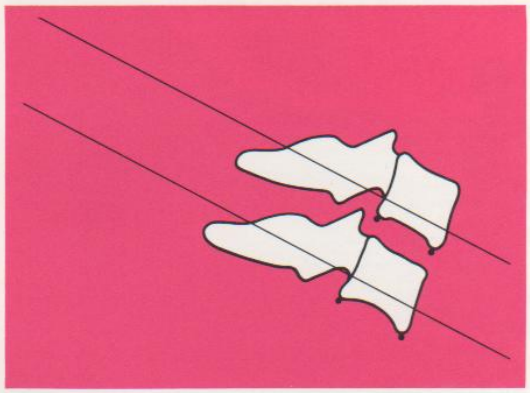


Figure 182: *A Vertebra With Posterior and Inferior Misalignment. The Lines Intersect Close to the Bodies.*

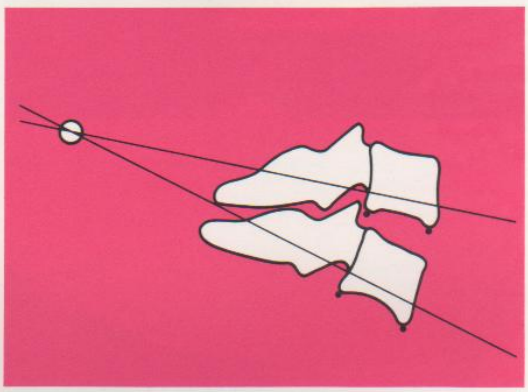
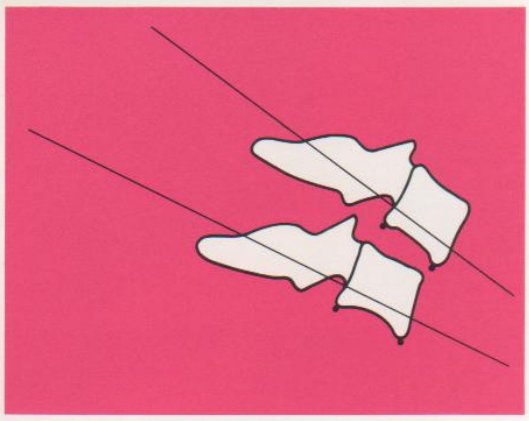


Figure 183: *A Vertebra Compensating Anteriorward. The Lines Diverge Toward the Posterior*



position is compensating for a subluxation elsewhere. When that subluxation is found and corrected, the compensating misalignment will be reduced spontaneously, without having to be repositioned manually.

Mechanism of Compensation

Quite frequently, compensating vertebrae will be found in the higher cervical segments, due to a subluxated lower cervical.

When a lower cervical slips posteriorward, the posterior direction of misalignment must be compensated for, to maintain body balance. To compensate for this posteriority, the upper segments of the spine misalign anteriorward.

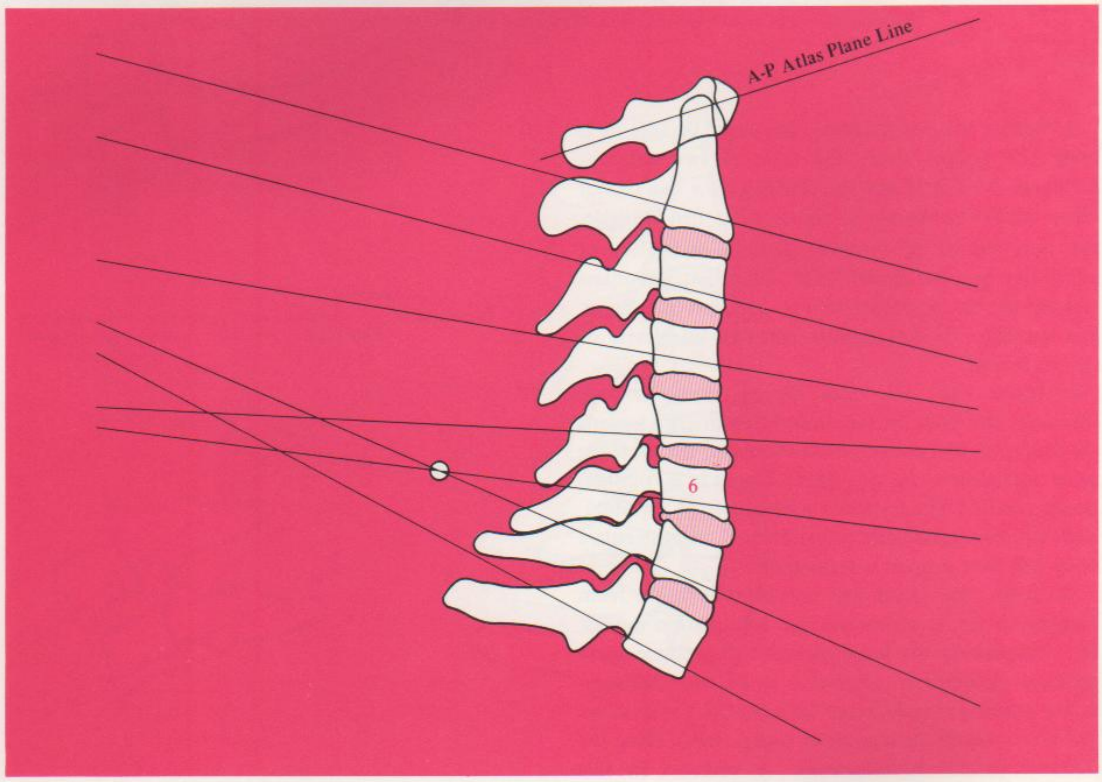
The lower subluxation may slip not only in a posterior direction, but it will probably go inferiorward as well. *The inferiority increases as the nucleus pulposus goes further forward, and the posterior portion of the disc wears thin.* As this occurs, the entire posterior border of the body tilts downward (Fig. 184).

This inferior misalignment must also be compensated for. Otherwise, the head would be tilted backward in a position of perpetual extension. The posterior aspect of the compensating vertebra misaligns superiorward, allowing the head to go forward into its neutral position.

These anterior and superior compensatory misalignments allow neutral placement of the head in its transverse axis of movement. In figure 184, the line drawn through the atlas represents the A-P plane of the atlas, and is designated the "A-P atlas plane line".

Since the head is not shown in the illustrations, the A-P atlas plane line can also represent the plane of the head, for it will be assumed that the atlas and condyle relationship is kept constant. Notice that when comparing figures 173 and 184, the atlas (head) is in precisely the same plane, but the contours of the curves are considerably different.

Figure 184: *As the Subluxation (Sixth Cervical) Becomes More Inferior, the Upper Segments Must Compensate to Keep the Head "Neutral". Compare With Figure 173.*



When the subluxated cervical is misaligned in directions other than posteriorward and inferiorward, as determined from the A-P film, these too must be compensated for. If, for example, the position of subluxation includes body rotation, then the compensating segments must rotate in the opposite direction in order to maintain the neutral head position. Likewise, if lateral wedging is involved, then the compensating bodies must wedge laterally on the opposite side.

From the preceding discussion, one should not get the idea that all cervical subluxations will be in the lower segments, or that the higher segments will always be compensating. There is a high incidence of involvement in the low-cervicals due to the nature and prevalence of the hyperflexion injury. But any of the cervical vertebrae may become subluxated, depending on how and where the traumatic forces are delivered to the spine.

The axis is very often involved, while the third and fourth cervicals are causative slightly less than those below. But the chiropractor can make no assumptions with any given patient. He must use all of his knowledge and skill to find and correct the subluxations wherever they may be.

Figures 185 through 196 show examples of cervical spines with various segments involved, and with different degrees of disc degeneration. Notice that the subluxation is identified by its body being numbered. Notice also that either the sixth or seventh cervical spinous processes are numbered. This represents the "vertebra prominens", the first palpably prominent spinous process from above downward. When both the sixth and seventh processes are prominent, both spinouses are so designated.

Use of the Lateral Film

It has been stressed before that the doctor should always examine the patient before analyzing the radiograph. This is true of the cervical spine as well. After being thoroughly convinced that he knows which vertebra is involved, he should then look to the x-ray to ascertain the directions it has misaligned.

From the A-P film he can determine body rotation and lateral wedging, if any exists. The lateral film will reveal whether or not there is any inferior misalignment of the vertebra in question (the posteriority is assumed).

Figure 185: *Posterior and Inferior Seventh Cervical Vertebra.*

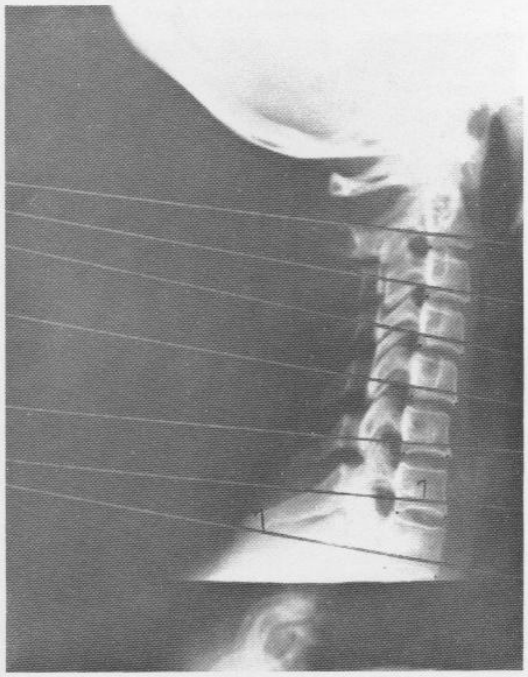


Figure 186: *Posterior and Inferior Sixth Cervical Vertebra.*

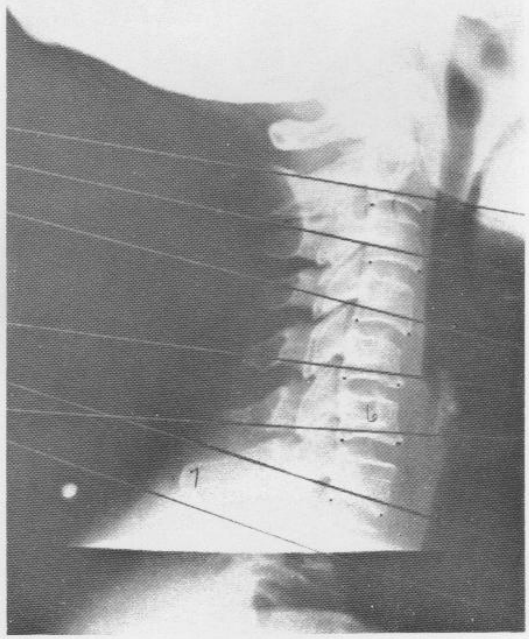


Figure 187: *Posterior and Inferior Sixth Cervical Vertebra, With Damaged Disc Above.*

Figure 188: *Posterior and Inferior Fifth Cervical Vertebra.*

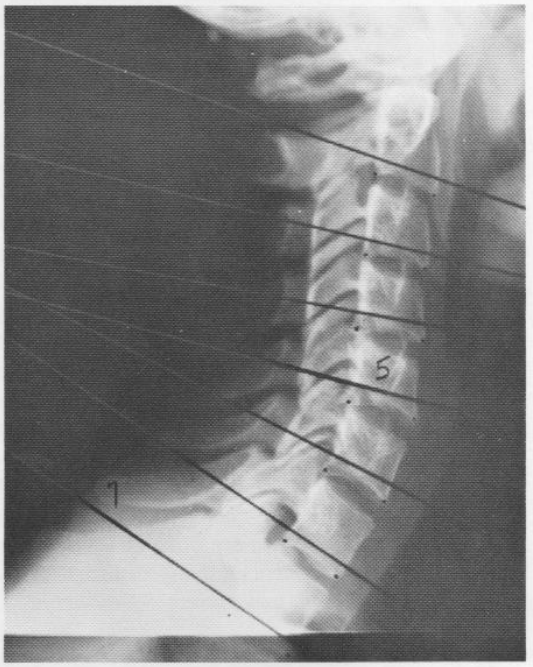


Figure 189: *Posterior and Inferior Fourth Cervical Vertebra, With Advanced Degeneration (D_5 Disc).*

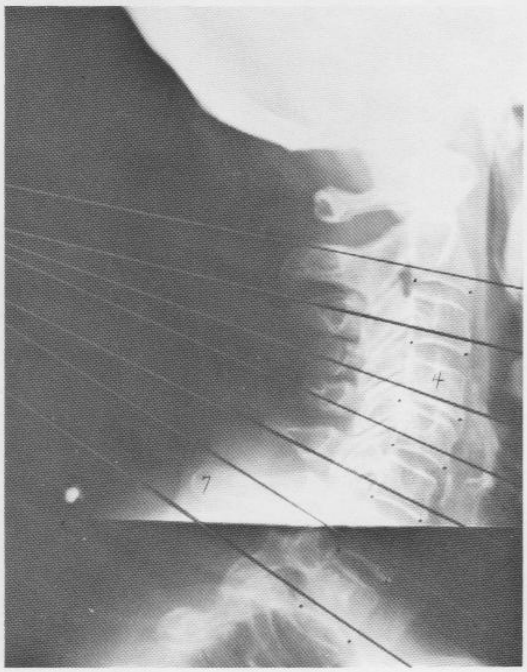


Figure 190: *Posterior and Inferior Third Cervical Vertebra.*

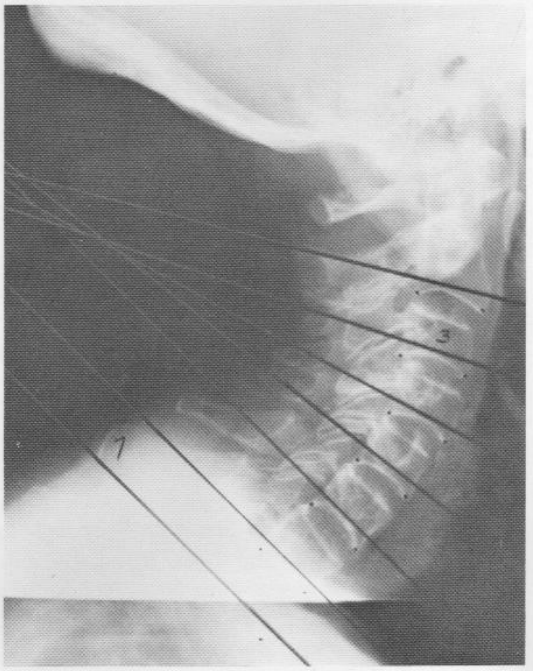


Figure 191: *Posterior and Inferior Axis Vertebra.*

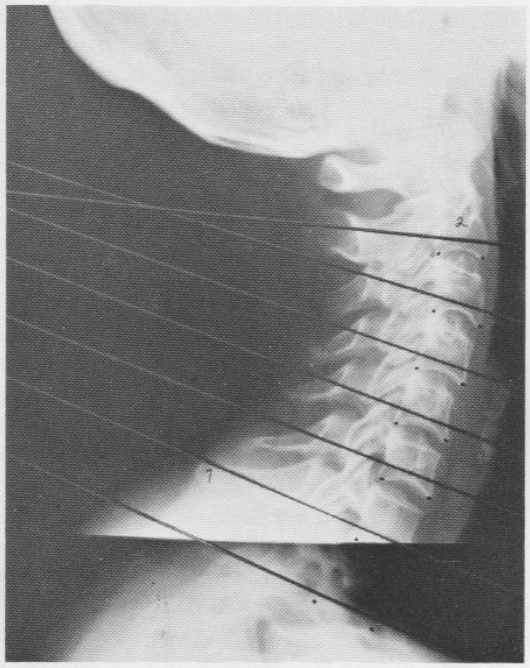


Figure 192: *Posterior and Inferior Fifth Cervical Vertebra. Both the Sixth and Seventh Are "VP".*

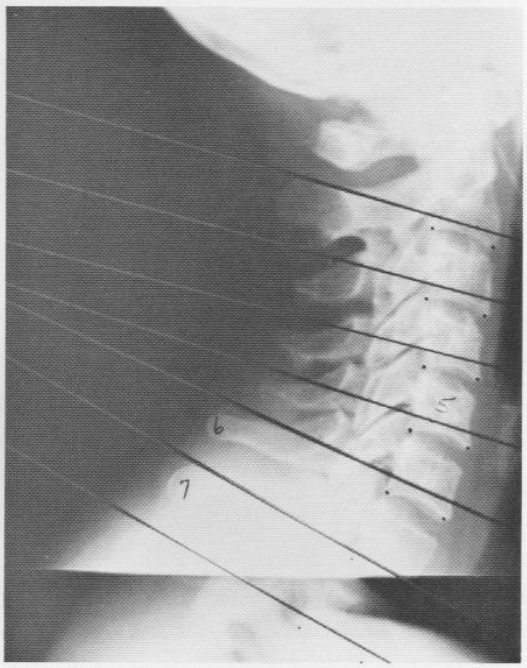


Figure 193: *Posterior and Inferior Sixth Cervical Vertebra, With "Notching" of the Bodies Above.*

Figure 194: *Posterior and Inferior Fifth Cervical Vertebra, With Advanced Degeneration (D_4 Disc).*

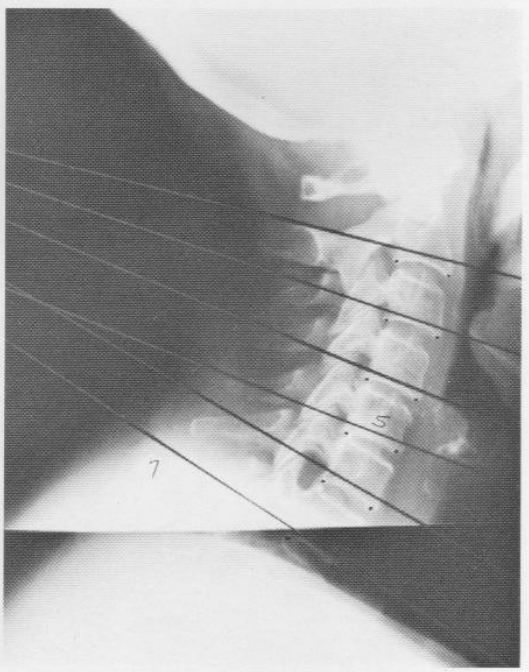


Figure 195: *Posterior and Inferior Fourth Cervical Vertebra.*

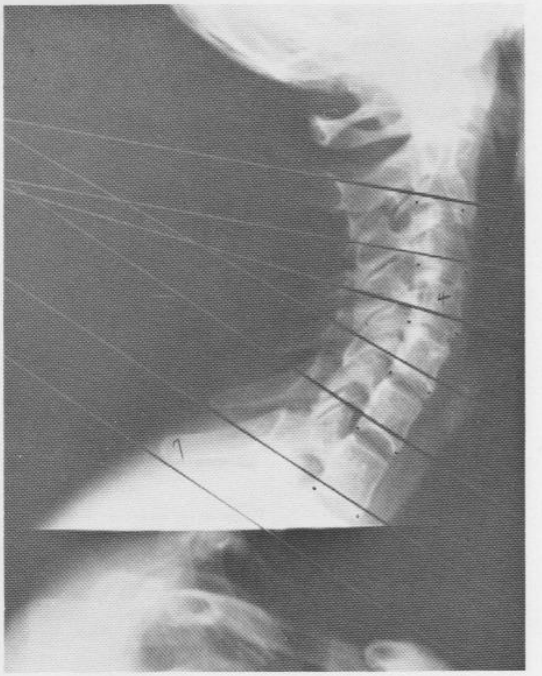


Figure 196: *Posterior and Inferior Sixth Cervical Vertebra.*

The lateral cervical film has another purpose, It can help the doctor arrive at the actual subluxation when his conclusion is uncertain. The decision as to which vertebra is producing the nerve pressure is more difficult to deduce when examining the cervical spine because the segments are smaller than in the other areas of the spine, and because the spinous processes are approximated within a small area. Since matching the right spinous process with the region of nerve pressure is part of the procedure used to determine the involved segment, there is a greater chance for error in the cervical spine because of the reduced area. It would not be difficult to choose one segment too low or too high, or even two segments, if the person had particularly small vertebrae and was lordotic in the neck.

This difficulty is usually confined to the cervical spine, but fortunately, the film provides a means of minimizing error, and can help the doctor reach the right decision.

After he has examined the patient and has decided which cervical vertebra is subluxated, he may use the film in the following way to confirm or nullify that decision.

If the vertebra the doctor chose as the subluxation has *more* inferior misalignment than the one above or below (i.e., is worse in degree), then he has undoubtedly made the correct choice. If, however, the one above or below has more inferiority, or possibly even two above or below, then he should re-examine the patient to see if his first decision was in error.

The reason for doing this is that *there is an extremely high correlation between the actual subluxation and the most inferior vertebra in that vicinity – in fact, they correspond almost one hundred percent of the time.*

If he finds after re-examining the patient that he may have reached the wrong conclusion previously, and if he can now match the examination findings with where the film indicates the subluxation should be, he is justified in changing his opinion. But, on the other hand, if he still finds that the evidence points to his first choice, then that conclusion should remain.

Finally, if in the doctor's opinion there is still ambiguity, and he is not able to select one over the other, then *the lower of the segments showing inferior misalignment should be chosen.*

For example, in figure 197, the sixth cervical would be selected over the fifth, if the evidence was not conclusive. It is the vertebra with the *most* inferior

misalignment, as indicated by the circled intersections. It is also the *lower* of the two segments showing any misalignment.

It is not being suggested that all cervical subluxations will have inferior misalignment. When the subluxation is acute, or relatively recent, the lines on the lateral film may still appear normal, or nearly so. But as the problem progresses, disc degeneration will develop and wedging will ensue.

Cannot Use Film Alone

In the cervical region, it would be very easy to want to use the film exclusively to find the subluxation, instead of examining the patient first and correlating the two sources of information. Probably, in the majority of cases the conclusions would be correct by using the film alone.

But chiropractic should not be practiced on a probability basis. Certainty must be the ultimate aim. If one relies completely on the film he will inevitably be in error on occasion, and he will not have developed the necessary investigative skills required to ferret out and find the answer to a patient's unrelenting problem.

This does not mean that when the subluxation is obvious we cannot look at a lateral cervical film and say to ourselves, "There it is". As our knowledge and experience grow, we will be able to do this more and more. Nevertheless, because of the variables in the spine, we will still sometimes find ourselves looking at the film and saying, "Would you believe *that one* was causing their problem?"

Repositioning the Vertebra

When a vertebra becomes subluxated, it is the *body* which misaligns on its disc. The body is much more apt to slip posteriorward when the two bordering segments are spread apart at their posterior aspects and brought together in the front (Fig. 198). This is essentially what happens when the neck is hyperflexed.

In order to reposition the vertebra onto its disc, the neck must be bowed in the opposite direction. The spine should be extended so that the bodies are "open" in the front (Fig. 199). Too much extension, however, will prevent the vertebra from moving. This will jam together the facets and hinder the forward movement of the body when the thrust is given.

Figure 197: *The Sixth Cervical is More Inferior Than the Fifth, as Indicated By the Intersecting Lines (Circles).*

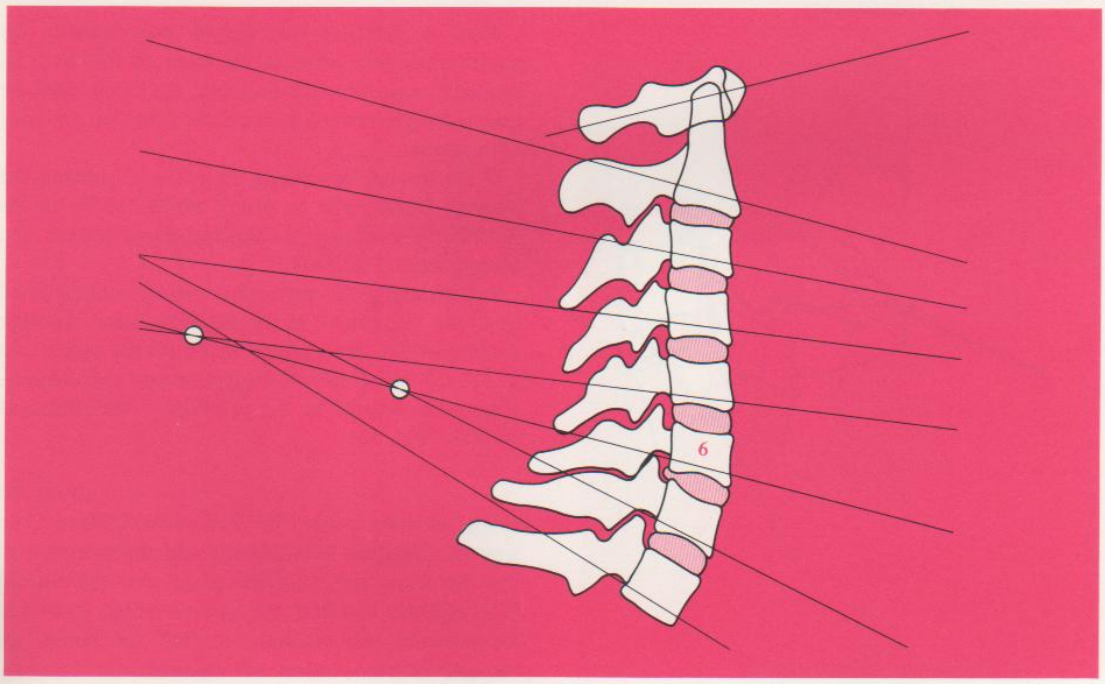


Figure 198: *As the Bodies Spread Apart at the Posterior, the Vertebra Slips Backward.*

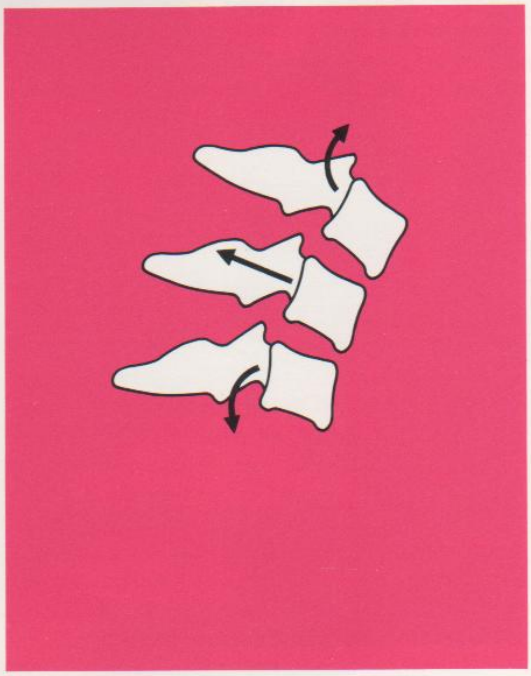


Figure 199: *"Opening" of the Bodies in Front, So the Vertebra Can Be Repositioned Anteriorward.*

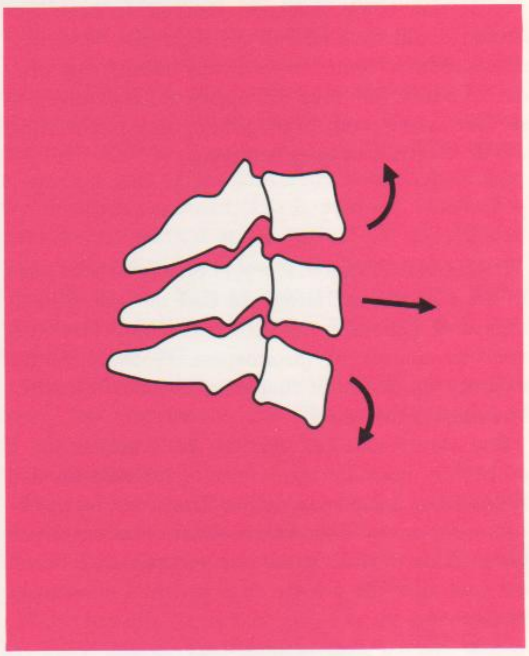
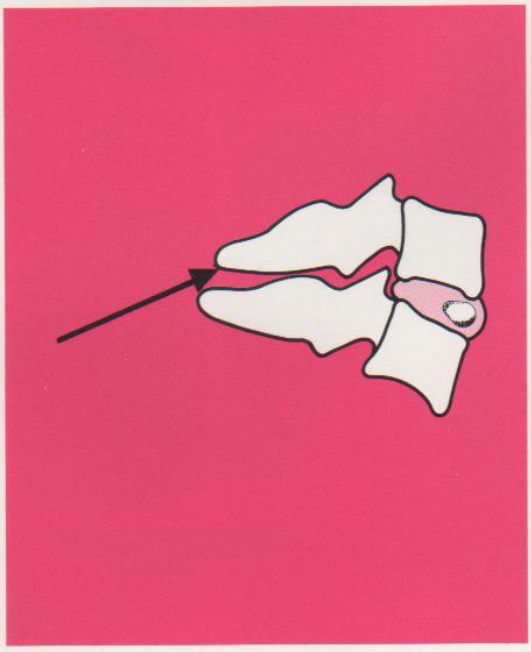


Figure 200: *Contact Point Under Tip of Spinous Process to Reposition Vertebra Superiorward and Anteriorward.*



Correcting Inferiority

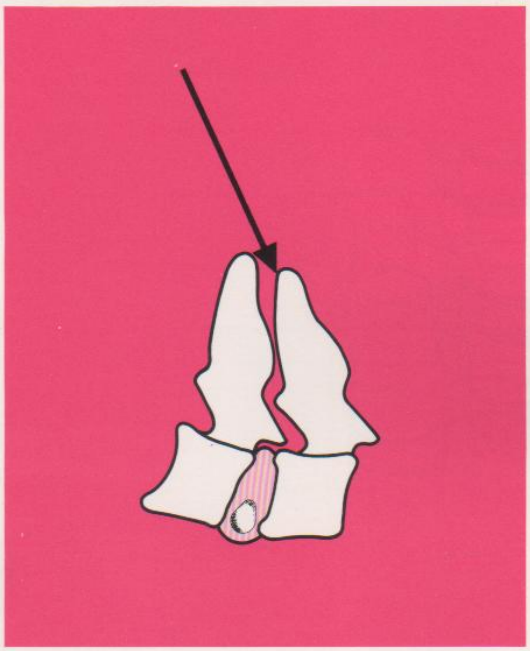
When a vertebra has slipped inferiorward, the nucleus has gone toward the front of the disc. To properly reposition the vertebra, the body must be directed superiorward so it can be lifted up and over the nucleus.

If the spinous process is the point of contact, the doctor's finger must be placed *under* the tip of the spinous. The thrust is directed superiorward and anteriorward (Fig. 200).

Repositioning the vertebra is usually accomplished best with the patient in the sitting position. Another method is for the patient to be placed prone, the thrust still being delivered superiorward and anteriorward with respect to the position of the subjacent vertebra (Fig. 201).

It is virtually impossible to reposition an inferior cervical vertebra with the patient supine. For one thing, with the patient in that position, there is no way of thrusting anteriorward and superiorward so that the body will be *lifted* up and over the nucleus (Fig. 202). In addition, the spine is flexed instead of extended in this position, so that the bodies are "closed" in front, instead of "opened".

Figure 201: *With the Patient in the Prone Position, the Same Superiorward and Anteriorward Direction of Thrust is Applied.*



Directions of Misalignment

As interpreted from the A-P radiograph, the cervical vertebrae misalign in the same directions as the segments in the other areas of the spine. The bodies can rotate the spinous processes to either the right or left, although *the lower cervicals are less apt to rotate than are the higher ones*. The axis, however, is particularly subject to body rotation. Any of the segments may misalign with lateral wedging.

The cardinal rule of only thrusting into the open side of the wedge always applies. Therefore, if the spinous rotates to the closed side of the wedge, the contact must be made on the opposite side. The contact point becomes the lamina, instead of the transverse process, which is inaccessible due to its position. Regarding the point of contact, the following statement is applicable to the cervical region: *When a cervical vertebra rotates so that the spinous process moves toward the closed side of the wedge, the lamina on the opposite side (i.e., on the open side of the wedge) is the point of contact for making the correction.*

Figure 202: *It is Virtually Impossible to Lift the Body Anteriorward and Superiorward Over the Nucleus With the Patient Placed Supine.*

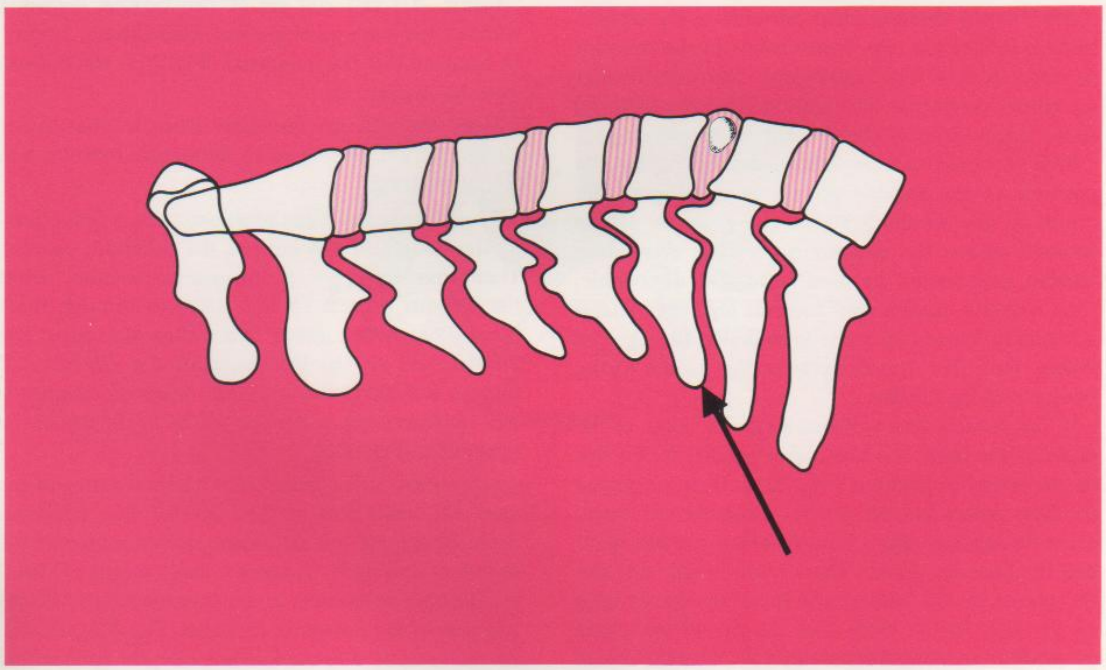
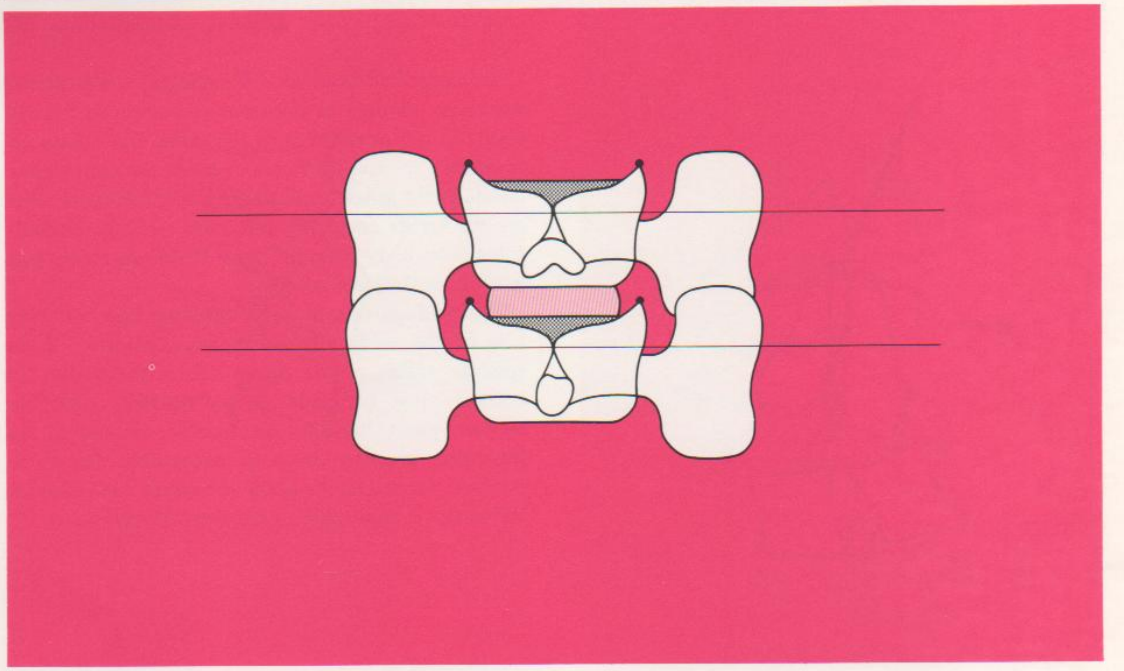


Figure 203: *Cervical Vertebra Showing No Misalignment. Dots Placed on Tips of Lateral Projections.*



Analyzing the A-P Film

After having decided which vertebra in the cervical spine is subluxated, the doctor refers to the A-P film to find out *how* it has misaligned. The x-ray listings are always correlated with motion palpation findings, so the true position of the vertebra can be ascertained.

Body rotation can be determined by noting the position of the spinous process in relation to the center of the vertebral body. The junction of the laminae, above the spinous process, is even more reliable, and should be used when it is discernible.

As with the lumbar and thoracic segments, lateral wedging is decided by plane lines drawn through the bodies. Each line should represent the surface of the body bordering the disc.

In the cervical film analysis, a reliable index of the plane of the body is a line drawn parallel to the tips of the lateral projections (Fig. 203). Dots are placed on these points and the parallel is aligned with them. Then the leading edge is brought below the disc space and the lines are drawn. These lines should represent the planes of the bodies, and therefore the wedging of the disc. In the event that the tips of the lateral projections are eroded or osteophytic, the lines should be determined from the vertebral plates adjacent to the disc in question.

Figure 203 and 204 are of two cervical segments without and with misalignment, respectively. It must be assumed that the inferiority (Fig. 204) was derived from the lateral film.

Since the axis has dissimilar characteristics, other landmarks are employed to determine rotation and lateral wedging.

To ascertain axis body rotation, a dot is first placed in the middle of the base of the odontoid process. Then, another is put at the lamina junction, above the spinous process. A line is drawn through these points, extending above and below the dots. The inferior end of the line indicates the direction of spinous laterality. For example, when the spinous is left, the lower end of the line will be to the left of the upper end. (Fig. 206)

Sometimes, lateral head tilt or lateral wedging of the axis will make this method invalid. The odontoid could be leaning too far to one side to represent the center of the body. A more reliable means of determining body rotation is to compare the relative shapes and sizes of the transverse foramina (Fig. 205, arrows). As the spinous is rotated to one side, the foramen on

Figure 204: *Cervical Vertebra Misaligned PRS–Inf.*

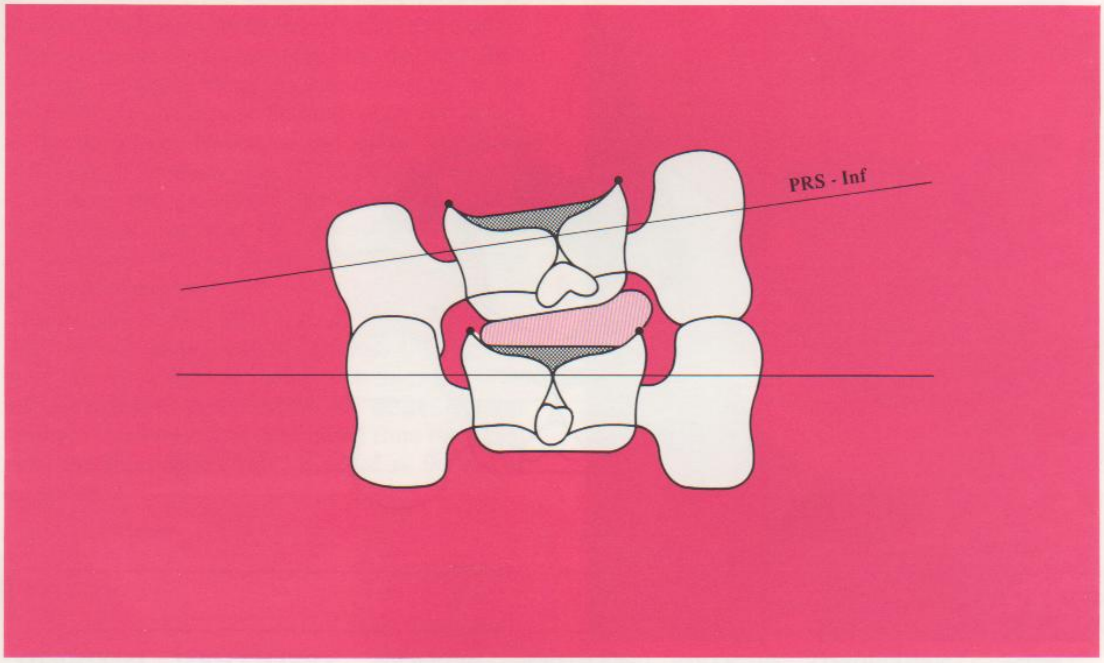


Figure 205: *Axis Showing No Misalignment. Line Through Odontoid and Lamina Junction is Vertical. Transverse Foramina Equal in Size and Shape (Arrows). Line Through Arches Shows No Wedging.*

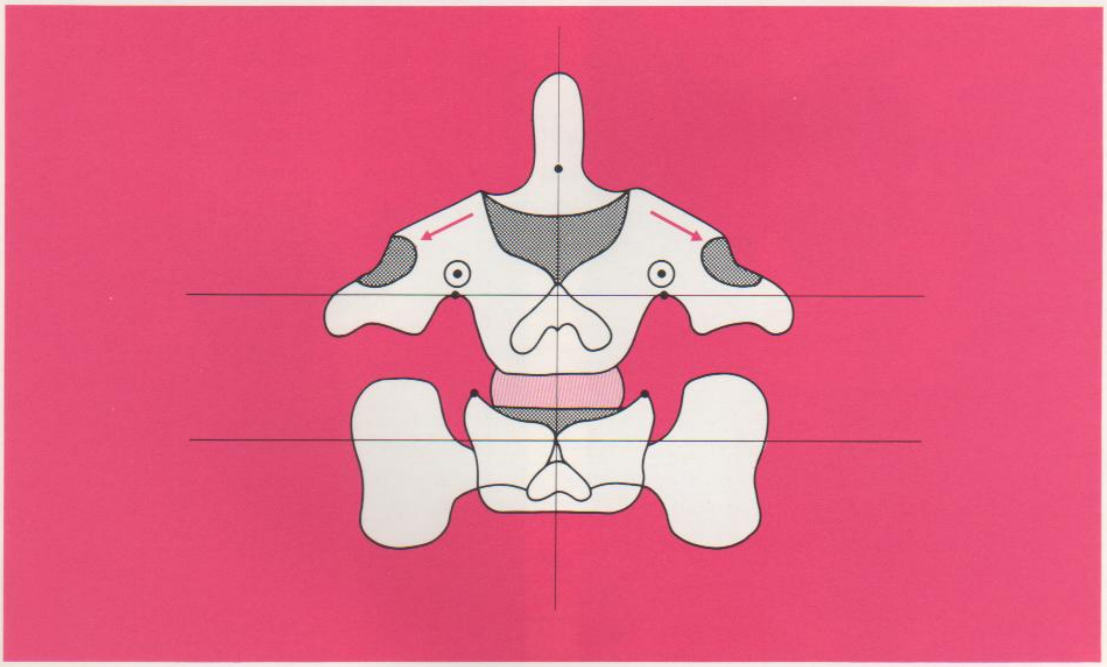


Figure 206: *Axis Misaligned PLI–La–Inf. Rotation Evident By Changes in Transverse Foramina and Odontoid–Lamina Junction Line. Wedge Line is Drawn Through the Pedicle Opacities. Contact for Correction on Right Lamina (Asterisk).*

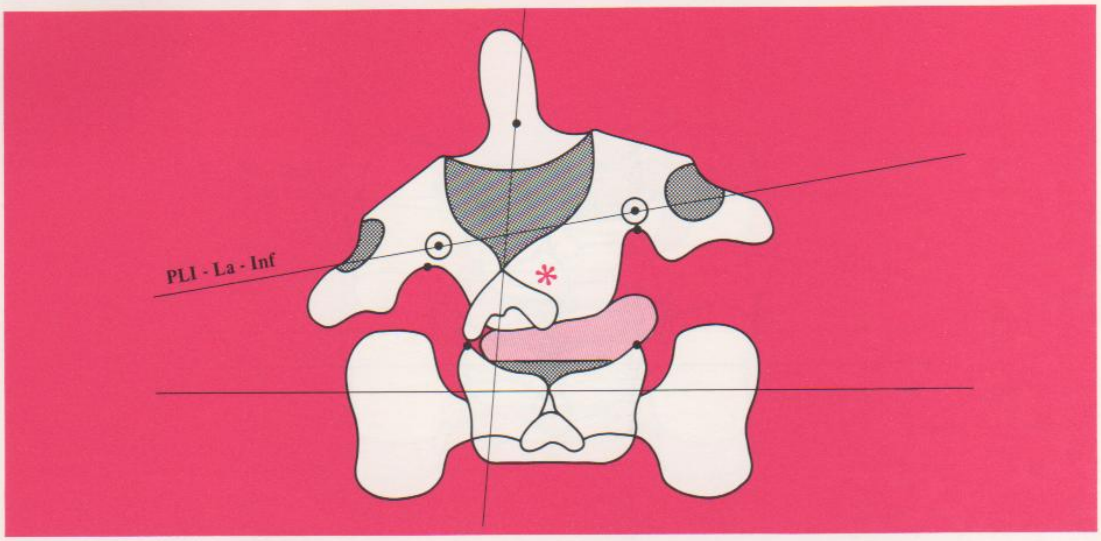


Figure 207: *The Cervical Listings (C2 through C7).*

LISTING	POSTERIORITY	ROTATION	OPEN WEDGE	SCOLIOSIS	CONTACT POINT	INFERIORITY
C2–C7						
P	Yes	None	None	May Be Either	Spinous	None
P–Inf	Yes	None	None	May Be Either	Spinous	Yes
PR–Sp	Yes	Right	None	May Be Right	Spinous	None
PR–Sp–Inf	Yes	Right	None	May Be Right	Spinous	Yes
PRS	Yes	Right	On Right	May Be Right	Spinous	None
PRS–Inf	Yes	Right	On Right	May Be Right	Spinous	Yes
PRI–La	Yes	Right	On Left	May Be Left	Left Lamina	None
PRI–La–Inf	Yes	Right	On Left	May Be Left	Left Lamina	Yes
PR–La	Yes	Right	None	On Left	Left Lamina	None
PR–La–Inf	Yes	Right	None	On Left	Left Lamina	Yes
PL–Sp	Yes	Left	None	May Be Left	Spinous	None
PL–Sp–Inf	Yes	Left	None	May Be Left	Spinous	Yes
PLS	Yes	Left	On Left	May Be Left	Spinous	None
PLS–Inf	Yes	Left	On Left	May Be Left	Spinous	Yes
PLI–La	Yes	Left	On Right	May Be Right	Right Lamina	None
PLI–La–Inf	Yes	Left	On Right	May Be Right	Right Lamina	Yes
PL–La	Yes	Left	None	On Right	Right Lamina	None
PL–La–Inf	Yes	Left	None	On Right	Right Lamina	Yes

that side becomes obscured, while that on the opposite side enlarges (Fig. 206). Naturally, motion palpation should be employed to verify all film findings when possible. This is particularly true of axis body rotation.

To determine axis lateral wedging, the axis plane line may be drawn along the inferior border of the body. Or, the line may be drawn through dots placed at the uppermost borders of the arches formed on both sides of the body (Fig. 205). A third alternative is to draw the axis plane line through the small white opacities just above the arches (Fig. 206). These are produced by the dense portion of the bone through the pedicles.

Figure 207 presents all of the cervical listings which will be found in segments C2 through C7. Many of these are represented in figures 208 through 216 in A-P radiographic views. When the entire segment misaligns inferiorward, as determined from the lateral view, the abbreviation "Inf" is added to the end of the listing.

Figure 209: *Third Cervical Listing, PLS–Inf.*

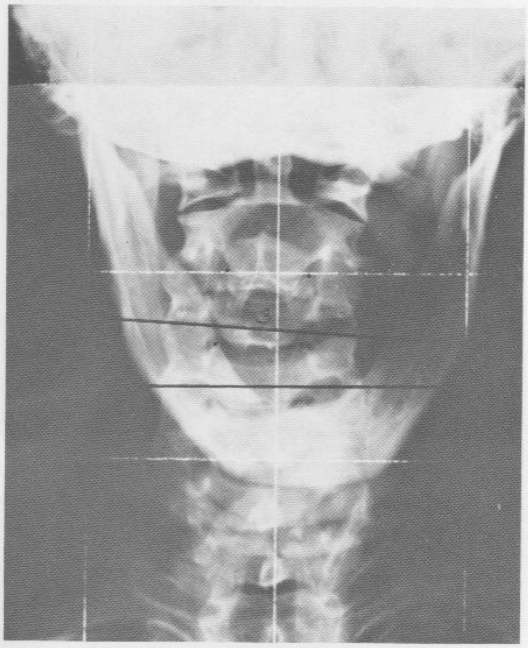


Figure 208: *Axis Listing, PLI–La–Inf. The Transverse Foramina Are Outlined.*

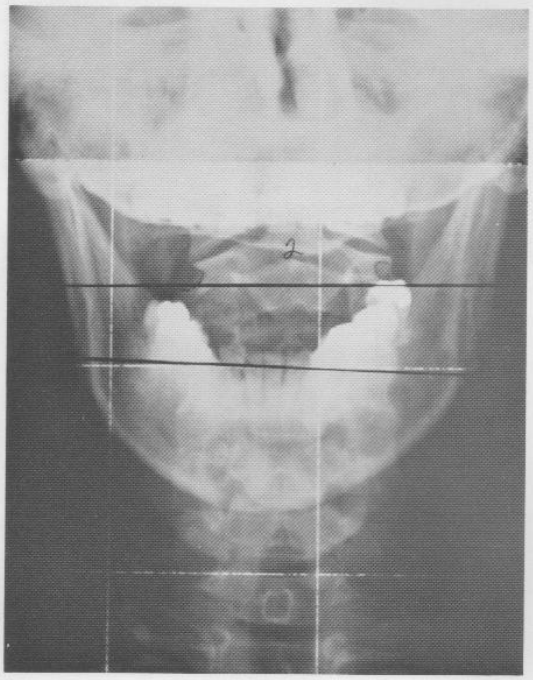


Figure 210: *Fifth Cervical Listing, PRS–Inf.*

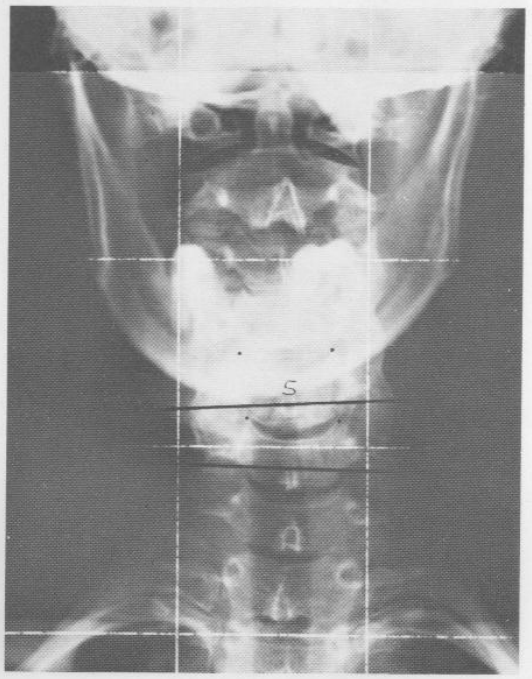


Figure 211: *Fifth Cervical Listing, PRS.*

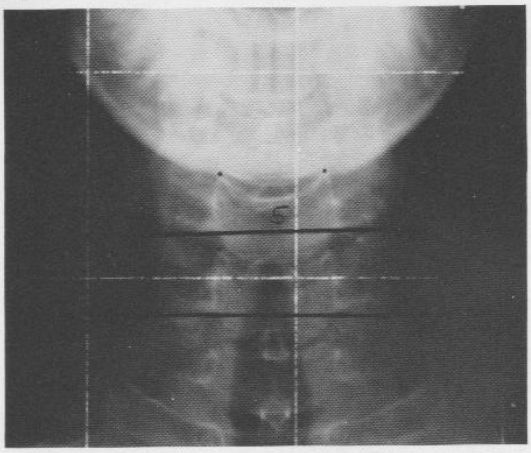


Figure 212: *Sixth Cervical Listing, PRS–Inf.*

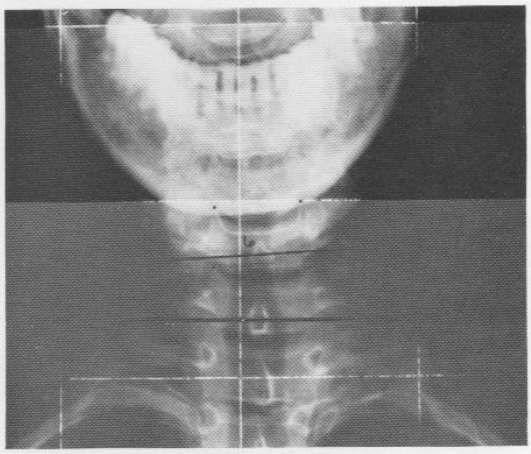


Figure 213: *Axis Listing, PR–Sp–Inf.*

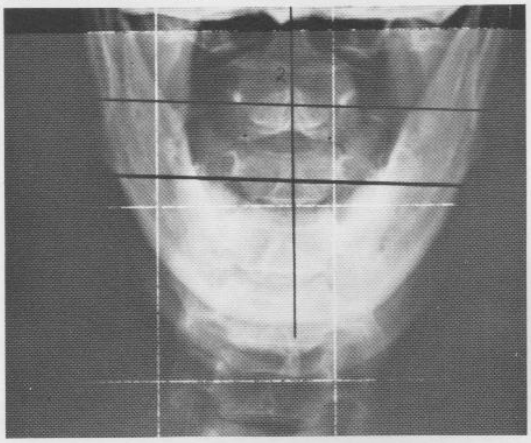


Figure 214: *Axis Listing, PLI–La–Inf. Marker on Seventh Cervical Spinous Denotes "VP".*

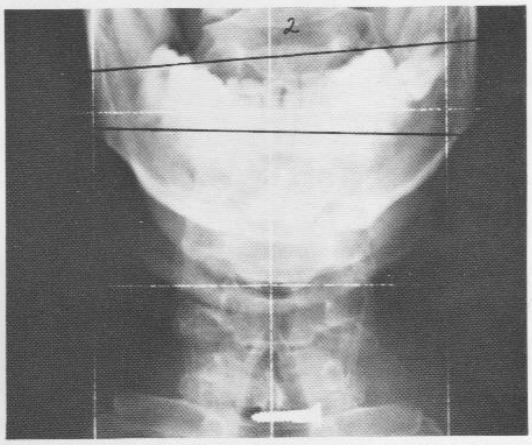


Figure 215: *Sixth Cervical Listing, PLI–La–Inf.*

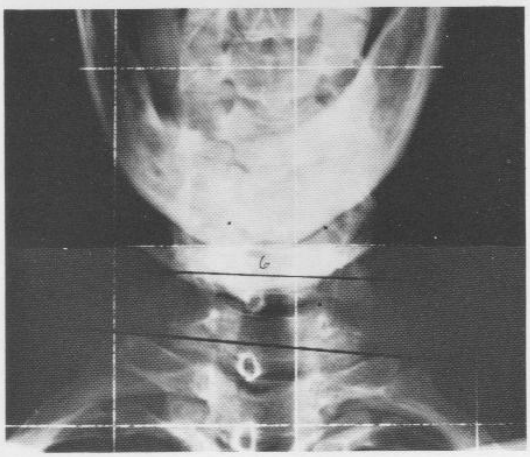
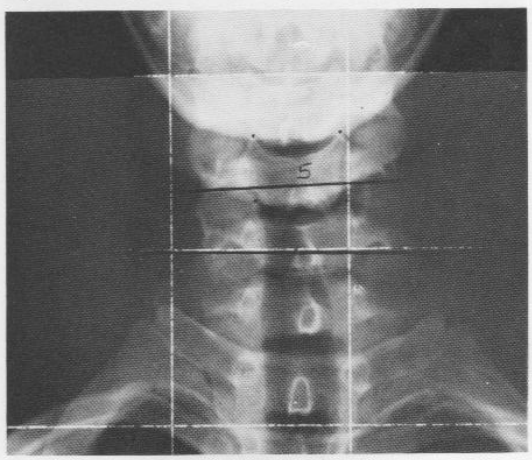
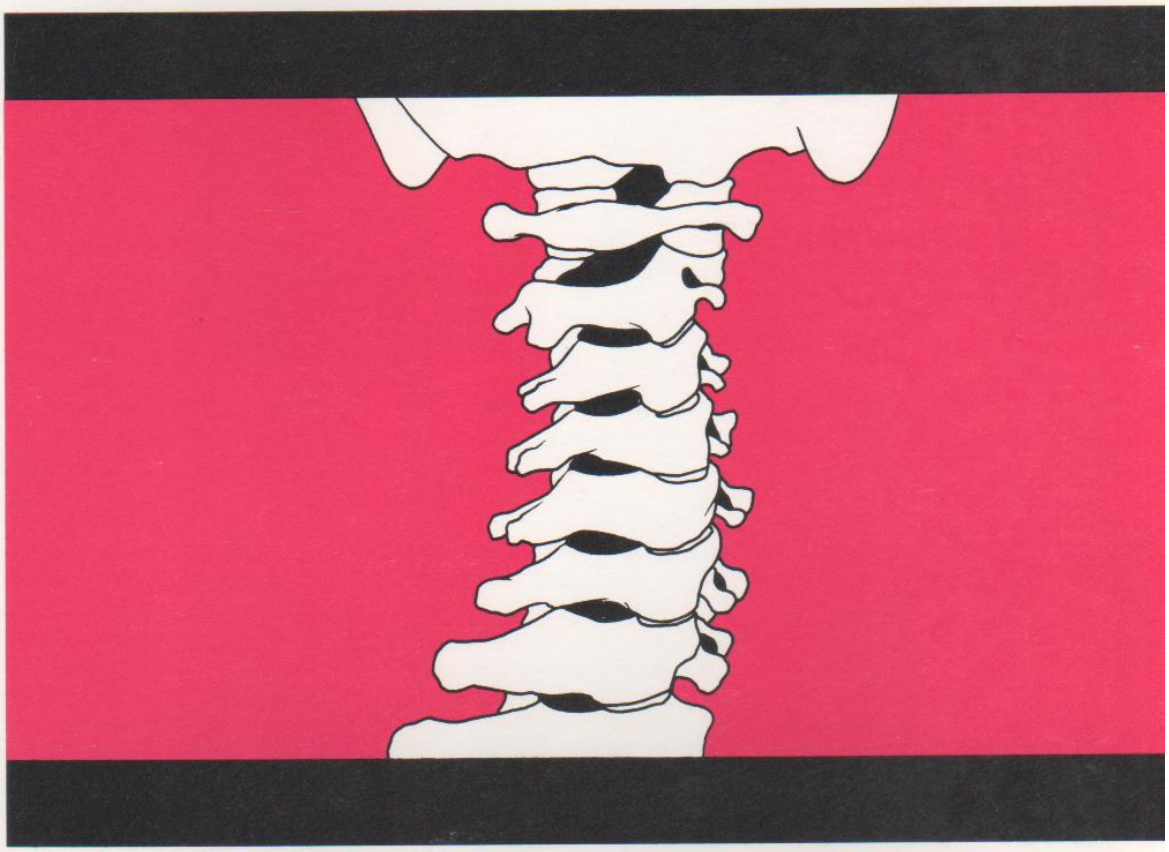


Figure 216: *Fifth Cervical Listing, PRS–Inf.*



Atlas and Occipital Condyle Misalignments

Chapter 9



Gonstead Chiropractic Science & Healing Art

Chapter 9

Atlas and Occipital Condyle Misalignments

The atlas vertebra has long been considered a bone of contention by many chiropractors. Some have spurned it altogether while concentrating elsewhere in the spine, whereas others have assigned to it an exclusive role in the etiology of nerve pressure, forsaking all segments below. The true significance of the atlas lies between these two extremes. It is neither all-important nor non-important; the atlas is *as* important as every other vertebra of the spine.

In any given patient the atlas may or may not be subluxated. It is up to the doctor to determine this. To automatically implicate the atlas because it is not in alignment would be an erroneous assumption in the greater majority of instances. Our investigations indicate an eighty-two percent chance of the misalignment of atlas being compensatory. Hence, it behooves the chiropractor to be certain when and where nerve pressure is present.

The same criteria that designate a sublaxation of the other segments apply to the atlas; namely, evidence of nerve inflammation and vertebral fixation at the segmental level. When these objective signs are absent at the locale of atlas, then they must be looked for lower along the spine.

The atlas is similar to the other segments in the way it produces nerve pressure. The same insidious mechanism is at work. However, the atlas does differ in one distinguishing way: in the kinds of nerve fibers it can compress. This is what has caused the confusion. Because of the distribution and the functional diversity of these fibers, many different parts of the body are under their influence. For example, tissues of the head, heart, lungs, liver, and legs can all be affected by an atlas subluxation. Consequently, many have regarded the atlas as the key to the cause of all endogenously induced disease. To the atlas-only advocate it became a sacrilege to consider any segment caudad.

Chapter nine puts the atlas in perspective. It explains how nerve pressure is produced at the upper cervical articulations, and what nerve fibers are involved. By understanding these concepts the many misconceptions held about the atlas in the past can be circumvented in the future.

In addition, this chapter describes the various directions in which the atlas and occiput can become misaligned when subluxated.

The Mechanism of Upper Cervical Subluxation

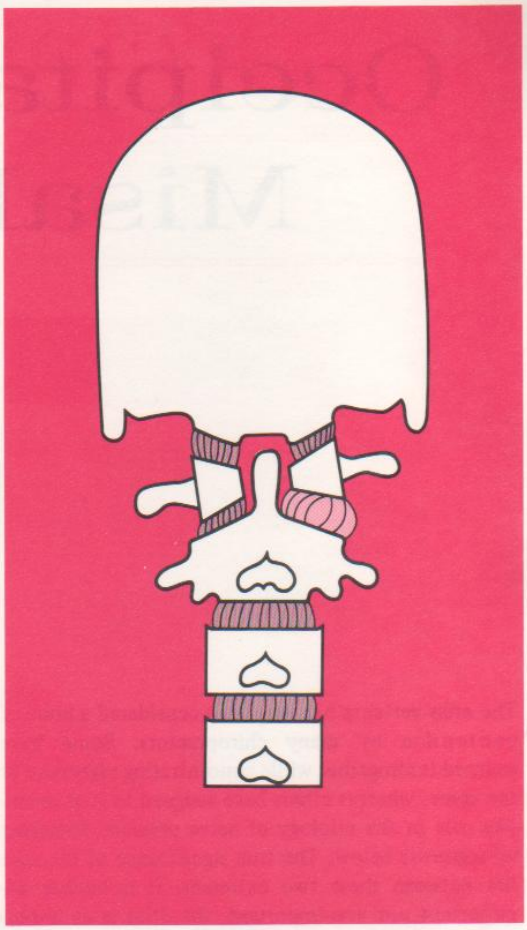
In this work the upper cervical articulations are regarded as those immediately above and below the atlas vertebra. They include the atlanto-axial articulation (between the lateral masses of the atlas and the superior articular processes of the axis), and the atlanto-occipital articulation (between the lateral masses and the occipital condyles). The outstanding difference in these articulations, as compared to those located between the vertebrae below, is that they have no intervertebral discs. Before proceeding with the discription of how nerve pressure is produced at the upper cervical atriculations, a brief review of the mechanism of subluxation of the lower segments is in order.

A prerequisite to subluxation is forced misalignment between two adjacent vertebrae to the degree where fibers of the intervertebral disc become deranged. An inflammatory reaction follows as a result of the tissues of the disc being injured. Edematous fluid infiltrates the disc, causing it to swell and protrude beyond its normal boundaries. The distended disc compresses nearby neural fibers and interferes with the normal transmission of nerve impulses. In order to reverse this detrimental process, the vertebra above the disc must be realigned to the position of the vertebra below, thereby allowing the inflammation to subside and the subsequent decompression of the nerve.

This same series of events must take place for a subluxation to occur at the upper cervical segments. There must be osseous misalignment, damaged interarticular fibers, infiltration of fluid into the joint space, protrusion of the interarticular tissues, and compression of adjacent neural fibers. However, instead of the interarticular tissue being an intervertebral disc, it is the *capsular ligament* which protrudes and compresses the adjacent nerve fibers.

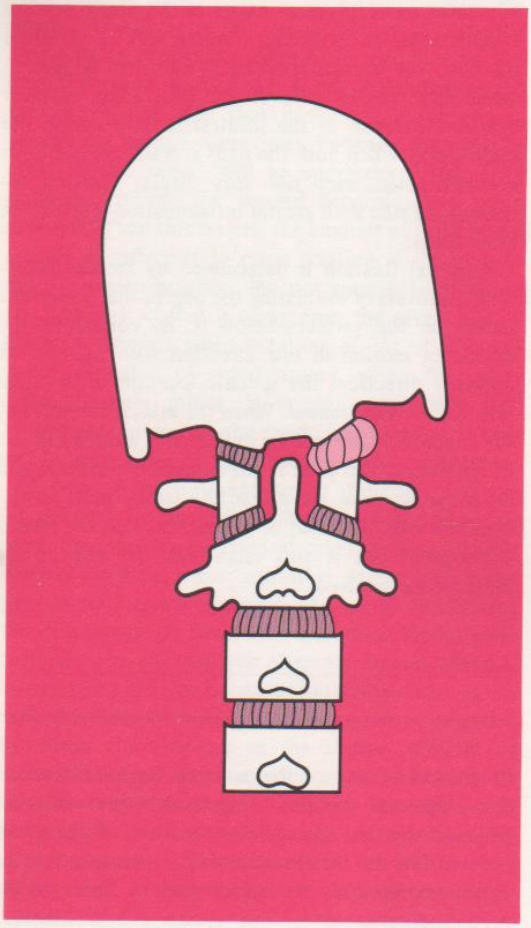
When there is an indication that nerve pressure exists at one of the upper cervical articulations, the exact segmental level of the nerve pressure must be ascertained. Until this has been established, it is not known whether the atlas or the occiput is subluxated. (As with all other areas of the spine, instrumentation, motion palpation, etc., determine which vertebra is subluxated; the radiograph will not reveal this information.) When the nerve pressure is found at the level of one of the articular capsules between the atlas and axis, a subluxation of the atlas exists (Fig. 217). If the nerve pressure is found at the level of a capsular ligament between the atlas and occiput, then it is the occiput which is subluxated (Fig. 218).

Figure 217: *The Atlas is Subluxated When an Articular Capsule Between the Atlas and Axis is Protruding and Producing Nerve Pressure.*



The importance of differentiating between atlas and occipital subluxations in this way cannot be overemphasized. In figure 218, which illustrates an occipital subluxation, it is not the alignment of the atlas which is at fault, for the atlas must be evaluated

Figure 218: *The Occiput is Subluxated When an Articular Capsule Between the Atlas and Occiput is Protruding and Producing Nerve Pressure.*



in relation to the axis only. "Adjusting" the atlas, that is, repositioning it to the axis, if indeed any amount of misalignment exists between the two segments, would not improve the relationship between the occiput and atlas. To reduce the protrusion of the atlanto-occipital articular capsule, the misaligned occiput should be repositioned to align with the atlas.

Actually, there are two possible ways in which thrusting on the atlas could improve the atlanto-occipital relationship. First, when the atlas is subluxated, compensatory misalignment often occurs between the atlas and occiput. Restoring the atlas-axis relationship will reduce the need for the compensatory misalignment, and therefore, the atlas-occipital alignment will be corrected automatically. Secondly, certain jab-like thrusts on the atlas which, ostensibly, "set the vertebra in motion" can sometimes fortuitously align the atlas with the occiput, even though it is the occiput which has subluxated on the atlas. The relatively small mass of the atlas as compared to the greater mass of the skull enables this to happen, plus the fact that the range of motion between the atlas and condyles is virtually unhindered, as by the odontoid or zygapophyses of the atlas and other segments, respectively.

A prevalent belief among many chiropractors is that when the atlas becomes subluxated, it does so by slipping out from under, and thereby misaligning with, the occiput. Consequently, they evaluate the direction of misalignment of the atlas from the standpoint of the occiput instead of the axis. When they reposition the atlas, they attempt to align it with the occiput. However, it is our contention that when the thrust is given on the atlas, and the atlanto-occipital relationship is restored, it is done so through either of the two mechanisms described above. It would be most commonly achieved through the mechanism described first (that of the atlas-occiput realignment being compensatory), since the atlas is subluxated far more often than the occiput, and since such corrections can be made fairly consistently.

This widespread misinterpretation stems from the doctor not realizing that the nerve pressure is produced by a protruding articular capsule, and that the capsule could be either above or below the atlas ring. In other words, it has occured from the actual mechanism of the upper cervical subluxation not being understood. But in addition, the belief that the atlas can slip out from under the occiput disregards a very basic mechanical concept, one which we refer to as the "foundation principle". Defining a *foundation* as a base of support for an object directly above it, the foundation principle can be stated as follows: *When the alignment between a supporting structure (foundation) and the object above which it supports is disrupted, their normal relationship should be re-established by moving the object onto its foundation, instead of by attempting to move the foundation under the structure above.*

In applying this to the human spine, it is recognized that the spinal column is a mechanical structure, and that the whole is made up of separate units. In the erect position each unit becomes dependent upon the one below for support. Thus, in any given pair of apposed vertebrae, the subjacent vertebra serves as the supporting foundation for the vertebra above it.

When a subluxation occurs, we consider the vertebra above the protruding intervertebral tissue as having slipped off its foundation. That is to say, the subluxated vertebra has become "abnormal", in that it has misaligned with the "normal" foundation segment below. (The foundation segment is "normal" because it has *not* misaligned with the vertebra subjacent to it.)

When adjusting a subluxated vertebra, an abnormally positioned segment is realigned with a normally positioned segment, and a correction is gained. To expect to be able to adjust a vertebra to the segment above it would be to infer that the occiput, for example, is the supporting structure for the atlas, which would not be in accord with the principles of mechanics.

The foundation principle applies to all segments with the following two execptions:

1. Sacral Base Posterior - In this misalignment the sacrum must be adjusted to the fifth lumbar, since there is no accurate means of repositioning the fifth lumbar vertebra in an anteroposterior direction. This causes no problems since the sacrum has no weight-bearing structure beneath it.
2. Coccyx - Being a non-weight-bearing structure, a subluxated coccygeal segment is repositioned to the sacrum, which supports it from above.

The following synopsis of facts regarding the mechanism of atlas and occipital subluxation should be well understood.

An atlas subluxation occurs from the atlas misaligning with the axis. The nerve pressure results from protrusion of one of the capsular ligaments between the inferior articular process of the atlas and the superior articular processes of the axis. The correction is effected by repositioning the atlas on the axis.

An occipital subluxation occurs from the occiput misaligning with the atlas. Nerve pressure results from protrusion of the right or left capsular ligament between the superior articular process of the atlas and the corresponding condyle. To correct the subluxation, the occiput is repositioned on the atlas.

Only rarely will both the right and left articular capsules of either an atlas or occipital subluxation be traumatized enough to cause nerve pressure on both sides of the spine. But even when both sides are involved, one of the capsules is invariably more inflammed and protruded than the other, affecting the nerve more severly on that side.

Upper Cervical Fixation

Whenever nerve pressure exists at the upper cervical articulations, an attendant finding will be vertebral fixation. The normal articular motion will be greatly diminished on the side of the protruding capsular ligament because of the infiltrated fluid within the joint space. When both the right and left articulations are inflammed, each side may display fixation, although the side with greater inflammation will also be more fixed.

Vertebral fixation is determined by *motion palpation,* a process of evaluating the degree that a segment moves on the vertebra below it. By comparing the extent of motion in one direction with that in the opposite direction, the specific location of the fixation can be ascertained. When the atlas is subluxated, for example, there will be unilaterally limited motion in relation to the axis. A lateral mass on one side will be palpably more fixed than the lateral mass on the opposite side. This not only confirms that the atlas is subluxated, but it also establishes the side of the lateral mass involved.

Neural Fibers Affected

Protrusion of one of the articular capsules between the atlas and occiput compresses either adjacent fibers of the first spinal nerve, or fibers of the spinal cord within the vertebral canal. An atlanto-axial protrusion compresses the spinal cord or fibers of the second spinal nerve.

An additional way that nerve pressure can be produced, peculiar to the atlas vertebra only, is for one of its transverse processes to compress the fibers of the vagus nerve. This becomes possible when the atlas undergoes rotational misalignment on the axis. The transverse process that is rotated anteriorward crowds the carotid sheath, and compresses the enclosed vagus nerve.

Still another potential source of nerve dysfunction from an atlas subluxation is through the superior cervical ganglion of the sympathetic chain. The superior ganglion lies just medial of the vagus, and is also subject to compression when the atlas transverse rotates anteriorly.

Although there are other neural components which are sometimes within the range of being affected by

atlas misalignment, the aforementioned are the ones especially vulnerable and most often involved.

When the atlas becomes so misaligned that its transverse process causes pressure on adjacent neural elements, usually one of the atlanto-axial capsular ligaments is protruding enough to also involve the second cervical spinal nerve. It will most often be the capsule on the side that is rotated anteriorward, though not always. Sometimes, however, the vagus or other nearby nerves will be compressed from atlas rotation without the second cervical nerve being affected. When this occurs, the amount of fluid in the capsule is sufficient to cause fixation of the atlas in the misaligned position, but not enough to protrude the ligament so that it compresses the nerve. This is likely to happen when rotation of the atlas is the major direction of misalignment, while the other factors remain minor. It is also conceivable that though the bulging of the capsule is extensive, it may not be protruding so as to compress the spinal nerve.

In view of the different neural structures that can be affected by an atlas subluxation (cervical spinal cord, first and second cervical spinal nerves, superior cervical ganglion, vagus, and other nerves such as the hypoglossal, spinal accesory, etc.), and considering the full range of functions that these fibers serve (somatic afferent, somatic efferent, visceral afferent, sympathetic and parasympathetic), it is understandable how this vertebra came to be regarded by some chiropractors as the source, directly or indirectly, of all nerve pressure within the body. It was observed that many conditions throughout all parts of the body could be affected by correcting atlas subluxations. The influence of the atlas seemed greatly out of proportion to that of any other segment, and a theory was needed to explain this phenomenon.

It was postulated that all nerve dysfunction results from spinal cord pressure, and that the neural fibers and nerve cell bodies in the first cervical neuromere are subject to osseous compression by the misaligned atlas ring. Some chiropractors implicated the axis in the production of such cord pressure, as well as the atlas. Others extended this hypothesis by alleging that cord pressure irritates the gamma efferent motor fibers, and causes paravertebral muscle contraction through the stretch reflex mechanism. They suggested that the contracted muscles were in turn responsible for producing subluxations below the atlas which were secondary to, and derived from, the atlas subluxation. These secondary subluxations, they further maintained, would be spontaneously reduced by correcting the atlas.

If these last assertions were true (all subluxations below the atlas are derived from paravertebral muscle contraction which is caused by spinal cord pressure at the first cervical neuromere), then it would follow that permanently correcting these subluxations would not be possible without first correcting the atlas. This, of course, is contrary to fact, for the atlas wields no more influence over the lower vertebrae than they do over it. Strictly speaking, the lower segments have more influence on the atlas, since adjusting a lower subluxation will often ameliorate the atlas by compensatorily changing its position on the axis.

A typical example of how an atlas subluxation produces peripheral symptoms is through involvement of the parasympathetic nervous system. Pressure on parasympathetic nerve fibers may cause a hypersecretion of various endocrine glands, resulting in a biochemical disturbance which affects the balance of the thyroid, adrenal, and sex hormones, as well as others. The result could be an endocrine disorder which has an adverse effect on the tissues of certain sensitized joints in the body. When this condition occurs, the synovial membranes and bursae become inflamed and swollen. In addition, the spinal articulations are affected. The intervertebral discs may become edematous and protruded, causing compression of adjacent spinal nerves. Consequently, while directly causing pathology to the involved joints, such an hormonal imbalance may also indirectly produce nerve pressure, even though the vertebra above the disc in question is not subluxated. If the vertebra is positioned level to the plane of the vertebra below, the disc may protrude on both sides, producing bilateral sciatica, for example.

Through the application of this work, one soon realizes that the far-reaching effects of the atlas subluxation are explained by the mechanism through which the atlas produces nerve pressure, and by the anatomical distribution and functional characteristics of the neural structures affected.

The basis for adjusting an atlas (or any other vertebra) must never be misalignment alone. Objective evidence other than misalignment will manifest itself if nerve pressure is present. The signs will be localized at the segmental level, and will be highly reliable for the vertebra in question. How to determine and evaluate these signs will be presented in the next chapters.

Atlas Misalignments

Atlanto-axial Alignment

We begin the description of atlas misalignments by first considering the optimal realtionship between the atlas and axis. This provides a reference system so that any deviation from the optimum can be measured in terms of direction and degree. Perfect alignment between the atlas and axis, as viewed from the lateral radiograph, must first be defined.

Since the atlas rotates around the odontoid process of the axis, the odontoid is used as a point of reference. The odontoid process is represented by a line which traverses it longitudinally. First, two dots are placed, one in the center of the base of the odontoid, and another so that it bisects the odonotid near its superior margin. The line is then drawn through these dots, as depicted in figure 219. This line is called the "odontoid line".

Another line, drawn perpendicularly to the odontoid line, is placed through the middle portion

Figure 219: *The Odontoid Line.*

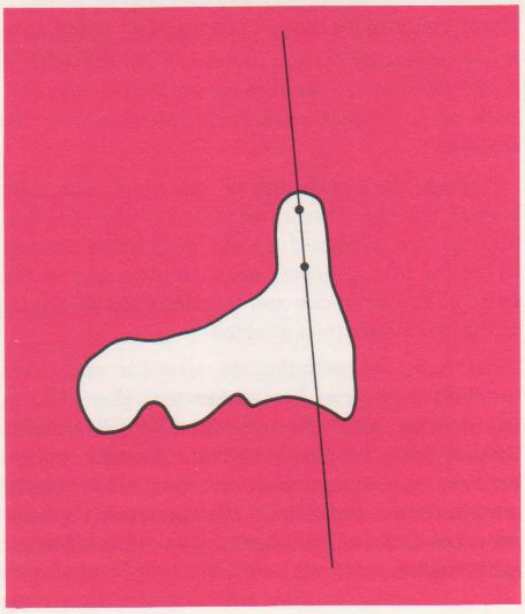


Figure 220: *The Odontoid Perpendicular Line is Drawn Ninety Degrees to the Odontoid Line.*

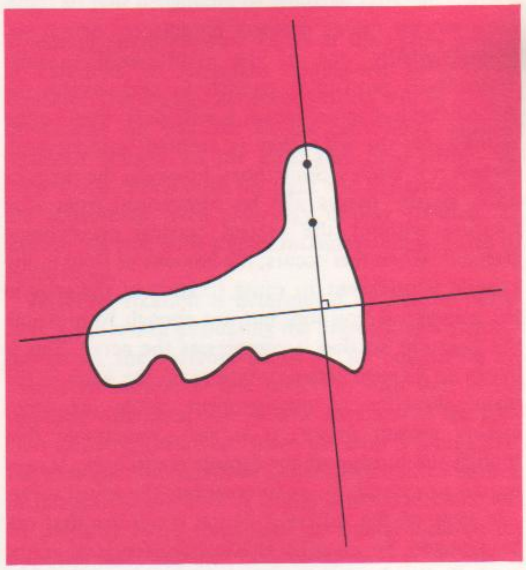


Figure 221: *The Two Dots Placed on the Atlas.*

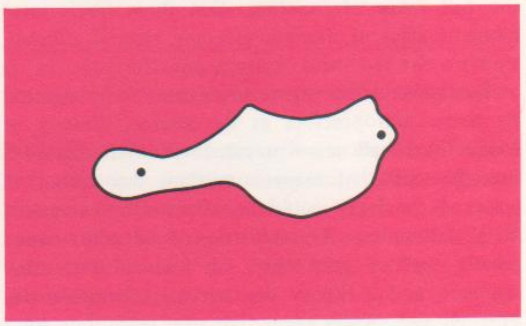
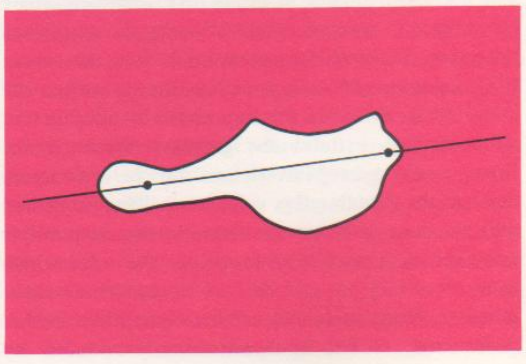


Figure 222: *The A–P Atlas Plane Line.*



of the axis body. It is designated the "odontoid perpendicular line" (Fig. 220). This line should always be made ninety degrees to the odontoid line, and should never be confused with the line drawn near the disc space, which represents the A–P plane of the axis body (chapter eight).

The "A–P atlas plane line" was mentioned in the last chapter, and is illustrated in figure 184. It is drawn by first placing two dots on the atlas, one in the center of the anterior tubercle of the anterior arch, and the other one in the center of the posterior arch near the posterior tubercle (Fig. 221). The line drawn through these dots should show about as much of the anterior and posterior arches above the line as below it (Fig. 222). Since the tubercle of the posterior arch is usually misshapen, the rear dot should be placed in front of the tubercle (in the center of the arch), so that it gives an accurate portrayal of the atlas plane. In addition, whenever the patient's head is tilted so that one side of the arch no longer completely overlaps the other, the rear dot should be placed in the middle of the broadened image of the arch, or in the center of the space formed between the two sides of the posterior ring (Fig. 223).

Figure 223: *When the Image of the Atlas is Tilted, the A–P Atlas Plane Line Must Still Divide the Posterior Arch into an Upper and Lower Half.*

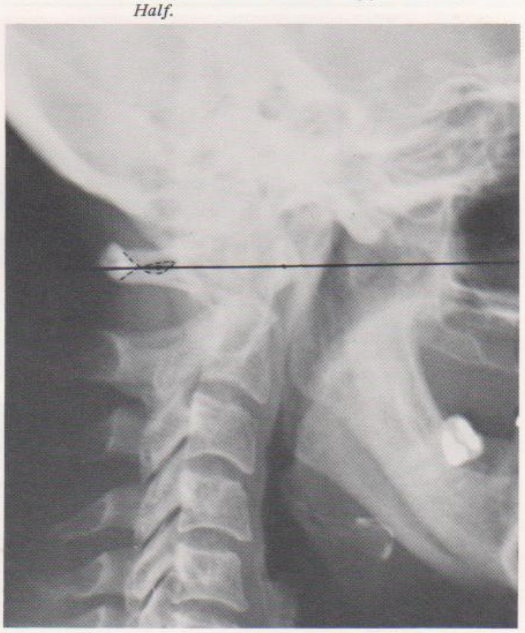


Figure 224: *The Atlas and Axis in Alignment, as Viewed Laterally.*

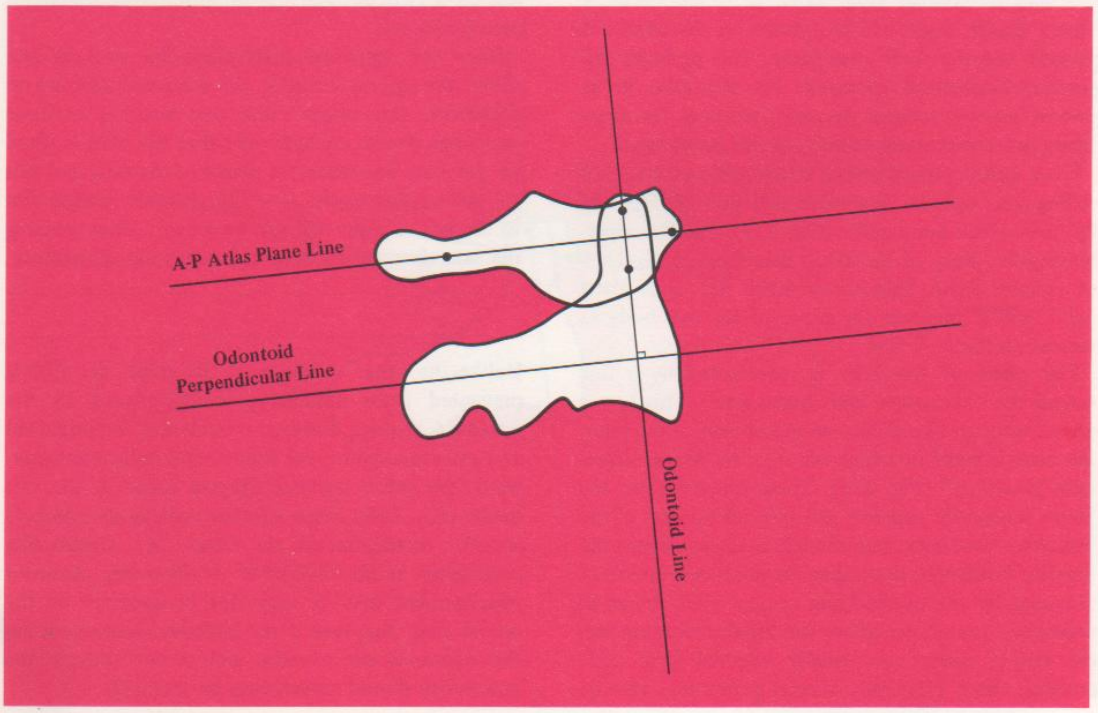
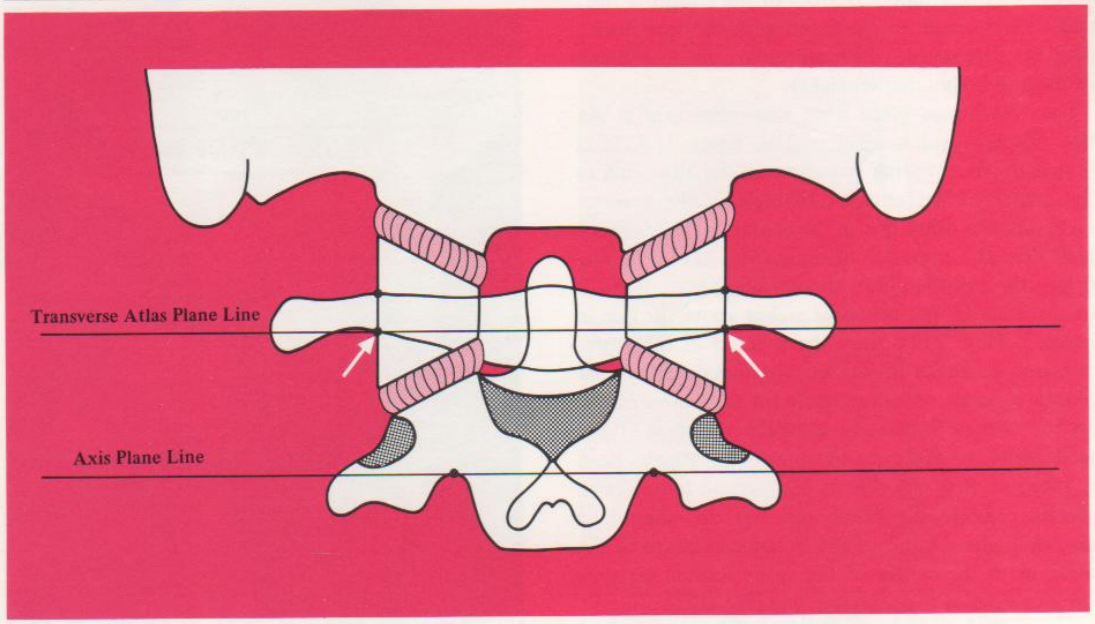


Figure 225: *Optimal Atlas-Axis Alignment in the Reversed Anteroposterior View.*



When the atlas and axis have perfect alignment, the A–P atlas plane line and the odontoid perpendicular line will be parallel (Fig. 224). In other words, a ninety degree angle will be formed by the odontoid process and the A–P atlas plane. This provides the greatest mechanical advantage for the atlas in its pivotal motion around the axis, while at the same time insures maximum patency of the spinal canal.

When viewing the atlas-axis relationship on the A–P radiograph, optimal alignment will also be depicted by lines which are parallel (Fig. 225). The line representing the plane of the axis is described on page 111 of chapter eight. This line is called the "axis plane line", and it portrays the plane of the axis body as viewed on the A–P film.

The plane of the atlas is represented by a line named the "transverse atlas plane line". This line is drawn through like points on either side of the atlas, the most reliable of which are the "transverse-lateral mass junctions" (Fig. 225). These junctions are the points where the superior and inferior borders of the transverse processes join the lateral masses. Since the superior borders of the transverse processes are often obscured by the overhanging occiput (not shown in drawings), the points where the inferior borders join the lateral masses are usually selected (Fig. 225, arrows). Other bilaterally similar points may also be utilized, such as the inferior tips of the lateral masses, the superior tips, etc. However, the most reliable line will be drawn through the inferior transverse-lateral mass junctions.

When the transverse atlas plane line and the axis plane line appear parallel, the atlas and axis are in alignment. One might think that wedging of these two lines would indicate only that the atlas is tilted on the axis. But when the planes of the atlas and axis are not parallel on the A–P film, lateral misalignment to the left or right will also be present, since wedging the laterality are related, and occur simultaneously.

Anterior Misalignment

Unlike the other vertebrae of the spine, the atlas is prevented from misaligning posteriorward by the odontoid process. Instead, considering the odontoid as a reference point, the atlas first misaligns anteriorward, the entire segment slipping ahead of the axis below (Fig. 226). *Since all atlas subluxations include anterior misalignment, the letter "A", designating anteriority, is the first letter of the listing.* Anterior misalignment may or may not be apparent on the lateral film. But even if the increased space between the odontoid and anterior arch is not obvious, the anteriority should nevertheless be assumed.

Figure 226: *The First Direction of Atlas Misalignment is Anteriorward.*

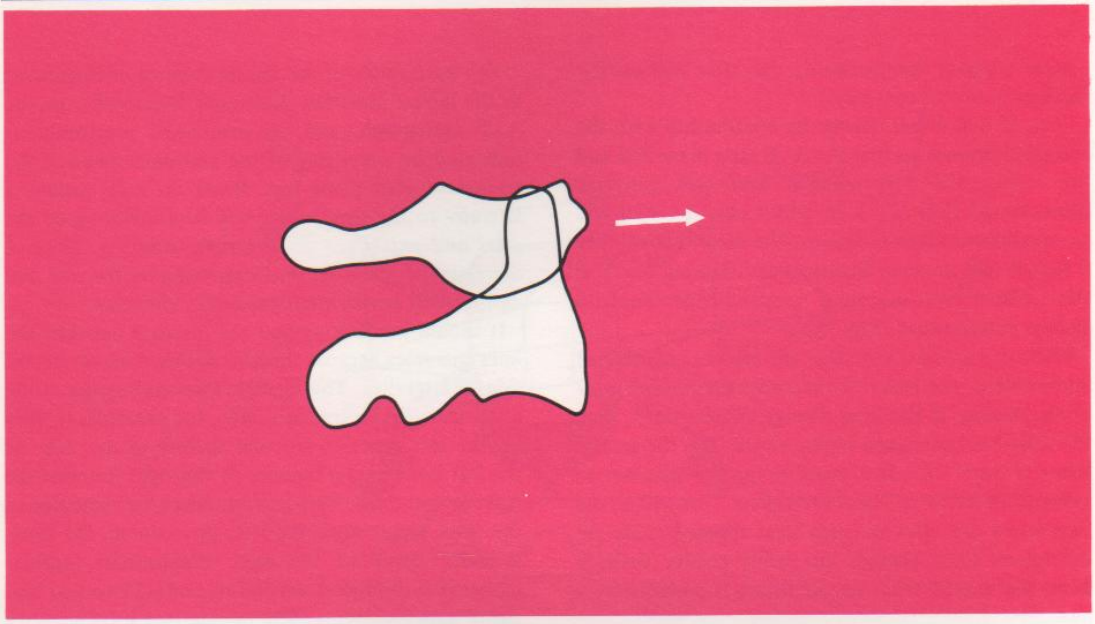
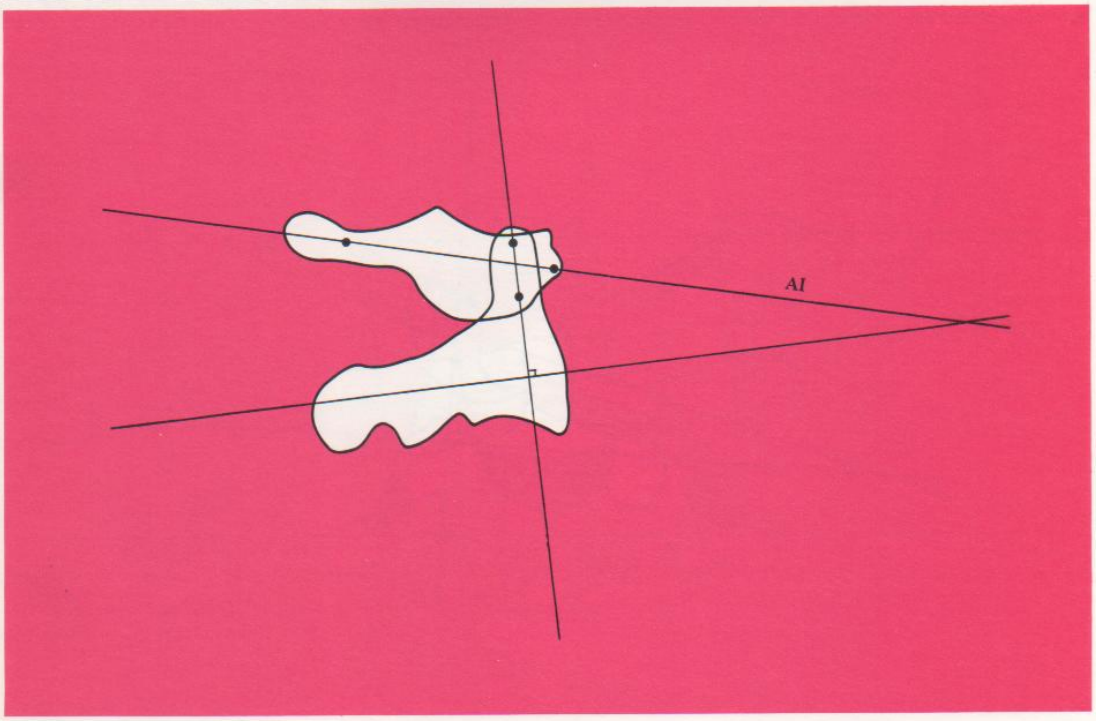


Figure 227: *An "Inferior" Atlas; It Has Misaligned Anteriorward and Inferiorward (AI).*



"S" or "I" Misalignment

After slipping anteriorward, the atlas will usually misalign in one of two ways:

First, it will either change its relationship with the odontoid process so that the A–P atlas plane line and the odontoid perpendicular line will converge anteriorward (Fig. 227), in which case the atlas will be misaligned inferiorward; or, the second possibility is that it will misalign superiorward, causing the A–P atlas plane and odontoid perpendicular lines to diverge anteriorward (Fig. 228).

When the lines indicate that the atlas has misaligned inferiorward, the letter "I" becomes the second letter of the listing. If the lines diverge anteriorward, then the atlas has misaligned superiorward, and the second letter is listed "S". It is possible for the atlas not to misalign in either of these directions. This will be the case when the atlas and axis lines appear parallel on the lateral film. Though this rarely occurs, when it does, the second letter of the listing is replaced by a dash.

Lateral Misalignment

The third letter of the listing denotes misalignment in the lateral direction. Laterality is derived from the A–P radiograph, and, as mentioned previously, is indicated by a wedging of the axis plane line and the transverse atlas plane line. *When the atlas misaligns laterally to the right, there will be a diverging of the atlas and axis lines on the right side* Fig. 229). *A diverging of the atlas and axis lines on the left side signifies left lateral misalignment of the atlas.*

It should be obvious that the distance between the lines increases because the atlas is raised higher on the side of laterality. This elevation occurs because as the atlas misaligns to the right side, for example, it rides up the left superior articular surface of the axis. As the left lateral mass inclines to the right, so must the right lateral mass. This in itself raises the right side of the atlas higher than the left. In so doing, the inter-articular tissue of the right atlanto-axial capsular ligament is distended beyond its normal limits so that tissue damage occurs. The consequent inflammatory

Figure 228: *A "Superior" Atlas; It Has Misaligned Anteriorward and Superiorward (AS).*

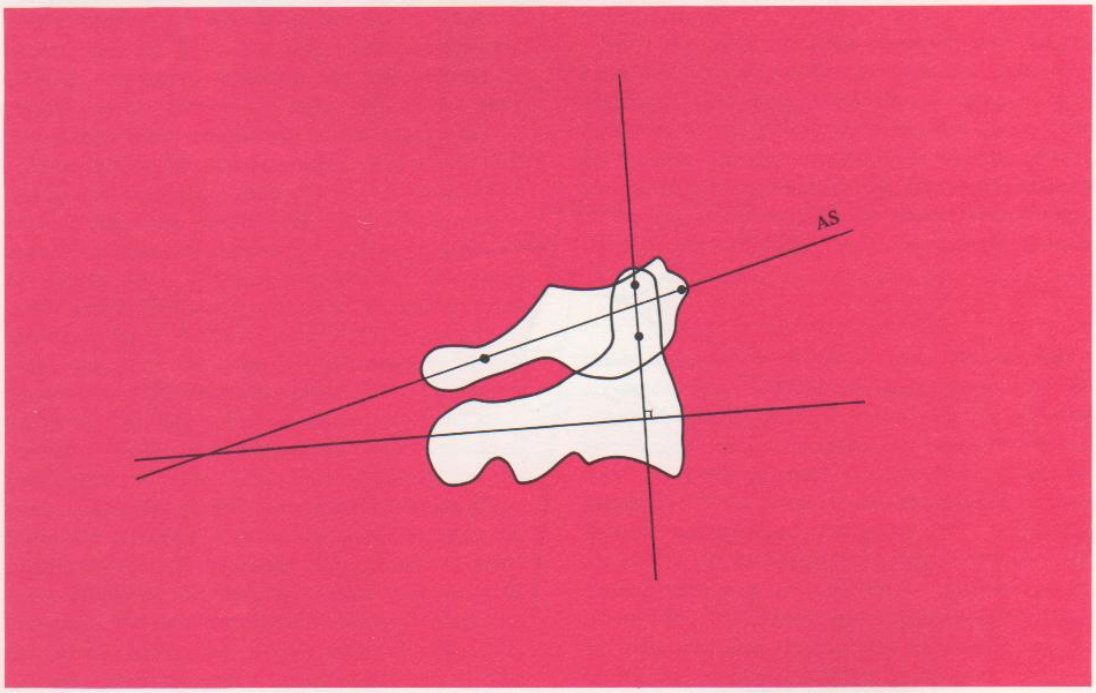


Figure 229: *Atlas Misaligned ASR.*

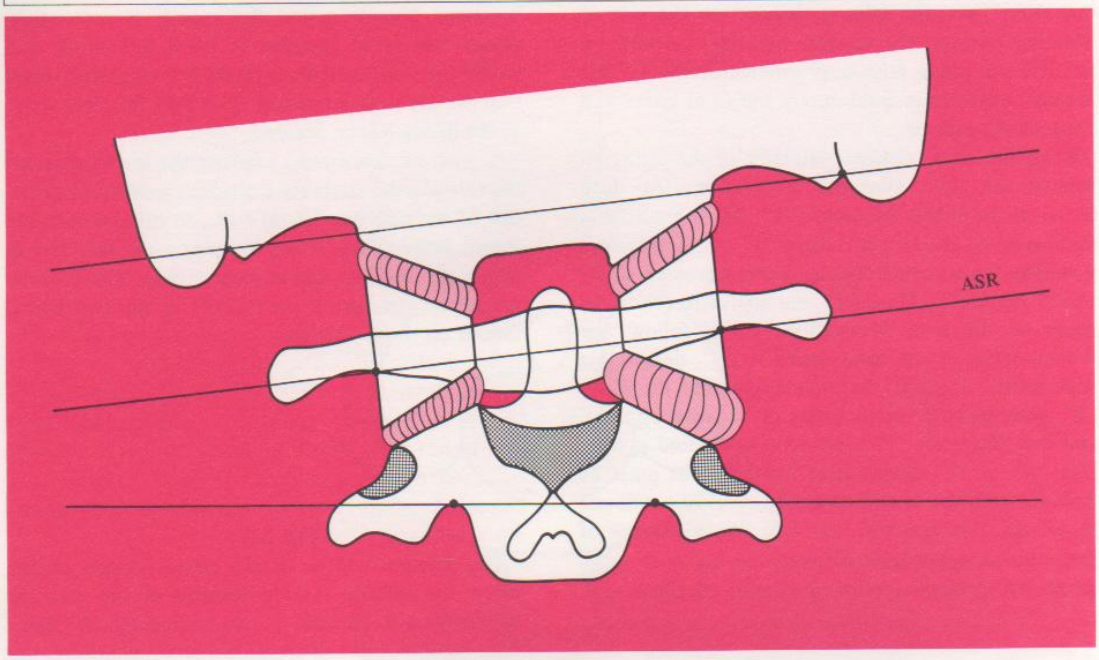
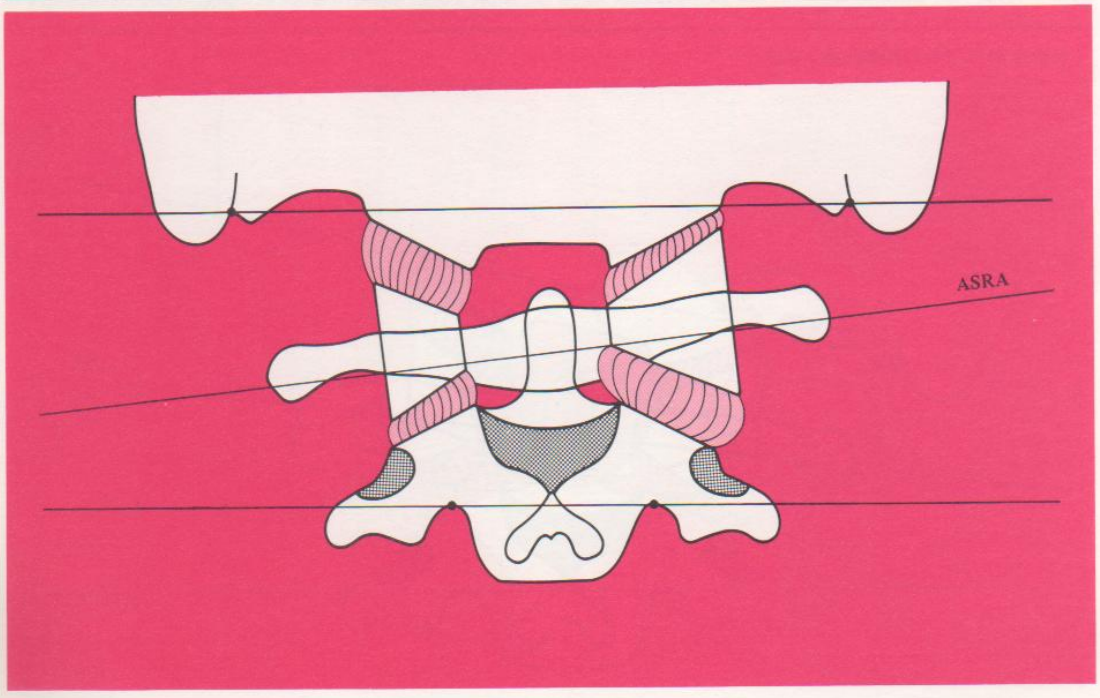


Figure 230: *Atlas Misaligned ASRA.*



fluid into the joint space causes the capsule to become swollen, and raises the atlas still higher on that side. Thus, the atlas is elevated on the side of laterality because the vertebra misaligns laterally on an inclined plane (the axis articular surface), and because edematous fluid enters the joint space and expands the capsule.

When the atlas misaligns laterally to the right, involving the right atlas-axis articulation, the thrid letter of the listing becomes "R". When the atlas is misaligned to the left, it is listed "L". Typical listings involving the types of misalignments discussed so far would be ASR, AIL, A–L, and so forth. (Note: In many of the A–P illustrations which follow, the second letter of the atlas listing is "S", designating superiority. It should be understood that the letter "S" was selected for purposes of consistency only, and that the letter "I" could have been used as well. The "S" or "I" direction of misalignment must be derived from the lateral film. The A–P film will not reveal this misalignment, nor will the appearance of the atlas be appreciably different on the A–P radiograph with either superior or inferior misalignment).

Rotational Misalignment

The fourth letter of the listing cannot be determined until the third is known. Having resolved the side of atlas laterality, we know that the lateral mass on that side is the one actually producing the subluxation. This is where the capsule is protruding, where the nerve pressure is being produced, and where the atlas vertebra is fixed. It is this lateral mass that we are now interested in so that the final letter of the listing can be decided.

It must be determined whether the lateral mass on the side of atlas laterality is situated anterior or posterior of the opposite lateral mass. In other words, *the fourth letter of the listing designates the direction in which the involved lateral mass rotates.* This is determined by comparing the widths of the two lateral masses on the A–P film. *When the lateral mass on the side of atlas laterality is wider than the opposite lateral mass, it is misaligned anteriorward, and the fourth letter of the listing is "A"* (Fig. 230). *When the lateral mass on the side of atlas laterality is narrower than the one on the opposite side, it is misaligned posteriorward, and the fourth letter of the listing becomes "P"* (Fig. 231).

The relative widths of the lateral masses change when the atlas is rotated because of the way the lateral mass is oriented to the radiograph. In figure 232, an atlas and axis are shown in a superior-inferior view. There is no rotation of the atlas on the axis, so the two lateral masses appear the same width on the film. Their equal widths are portrayed by the size of

Figure 231: *Atlas Misaligned ASRP.*

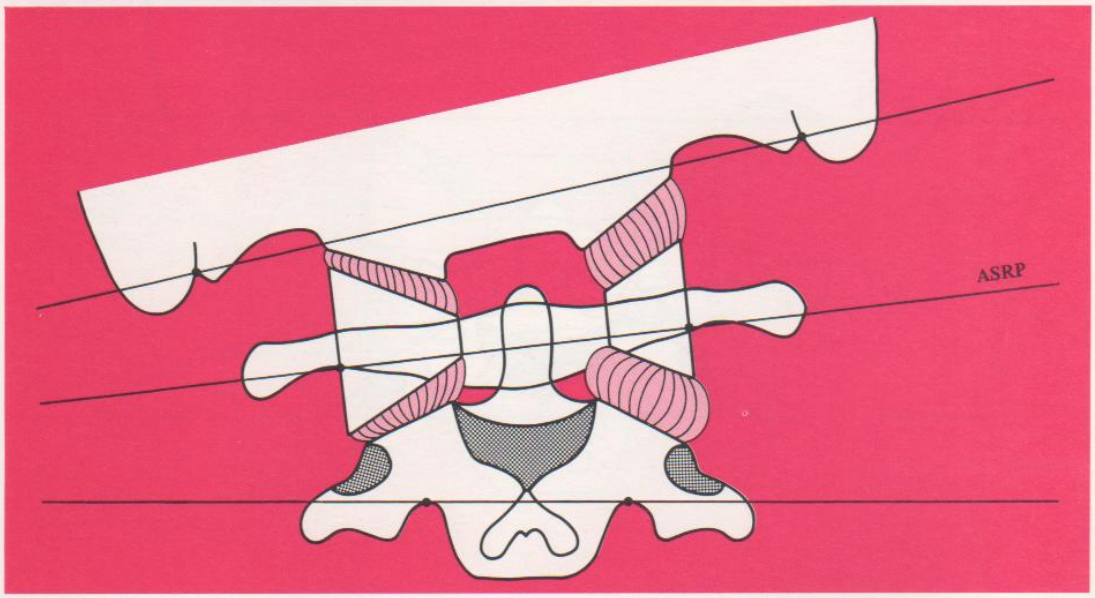


Figure 232: *Atlas With No Misalignment Showing Lateral Masses of Equal Width.*

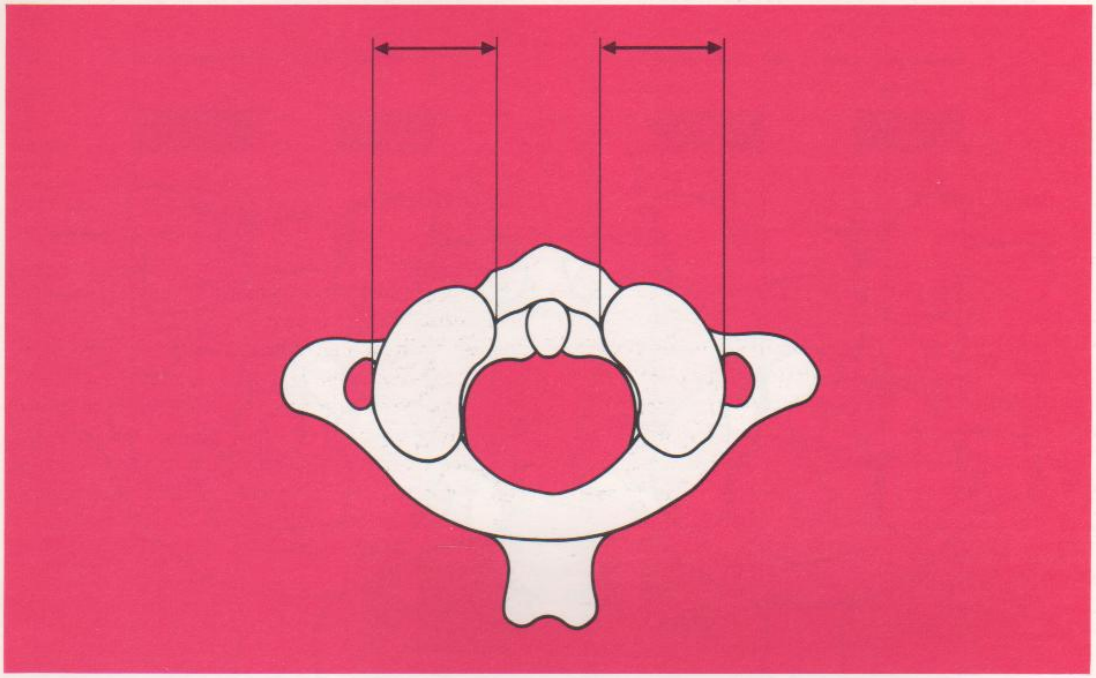


Figure 233: *ASRA Atlas–The Right Lateral Mass is Projected Wider Than the Left.*

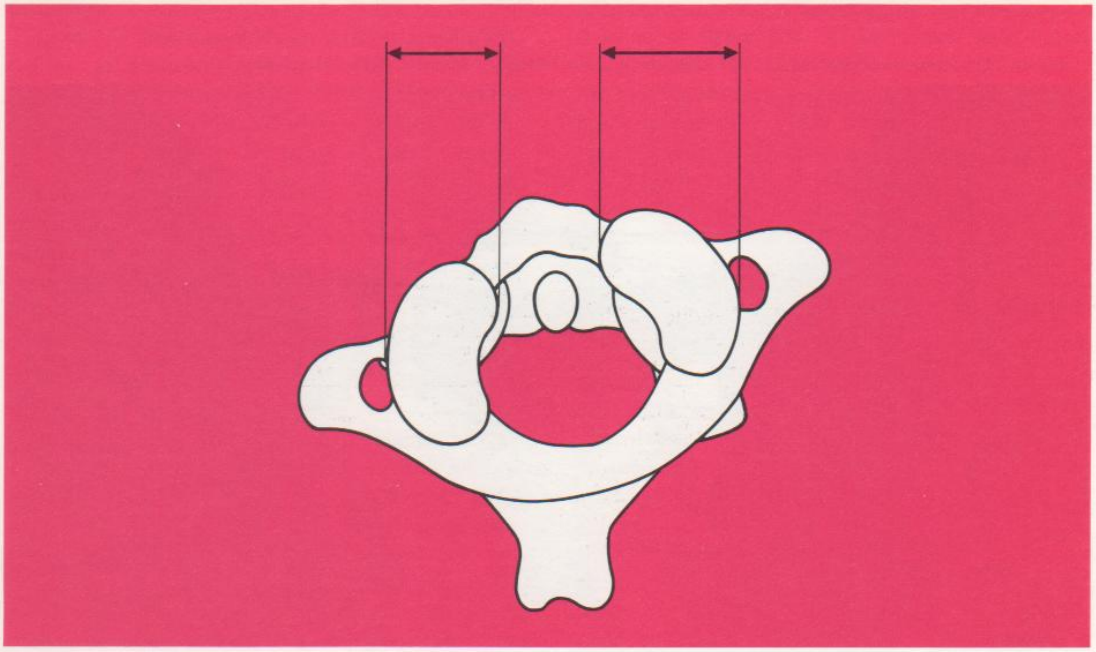


Figure 234: *Areas of Radiolucency On the Medial Borders of the Lateral Masses Indicate Atlas Rotation.*

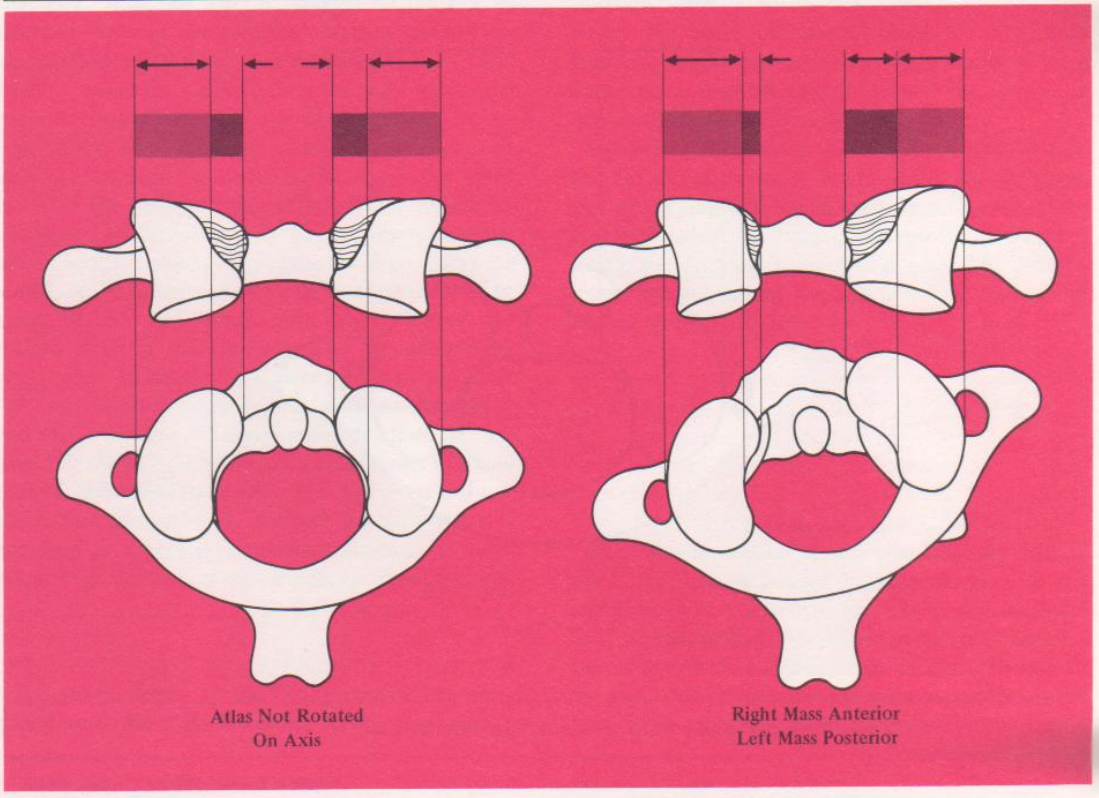


Figure 235: *Atlas Misaligned ASLA; The Radiolucent Area Widens on the Side of Anterior Rotation.*

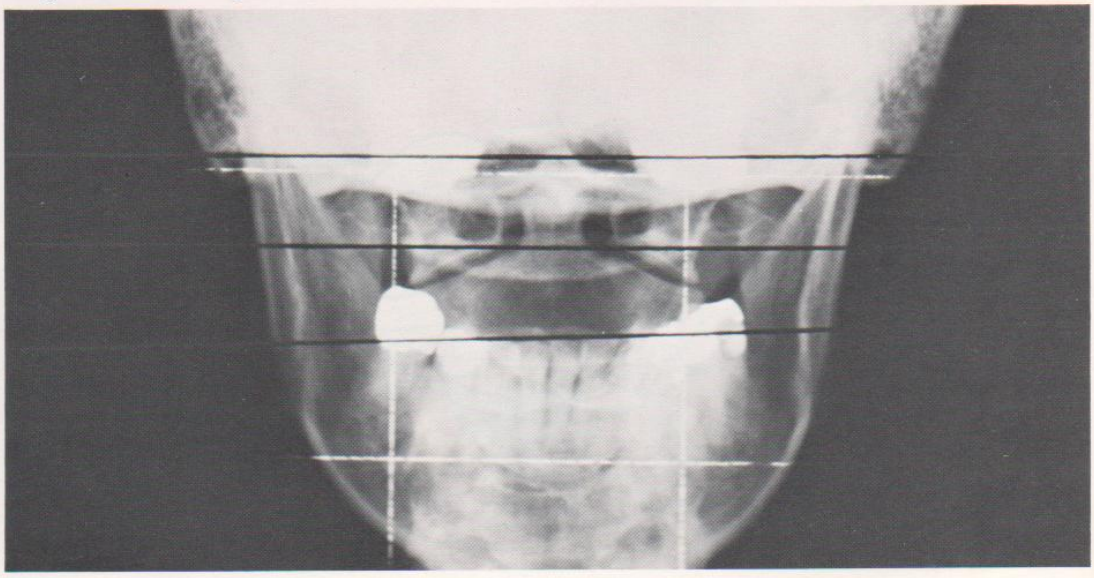
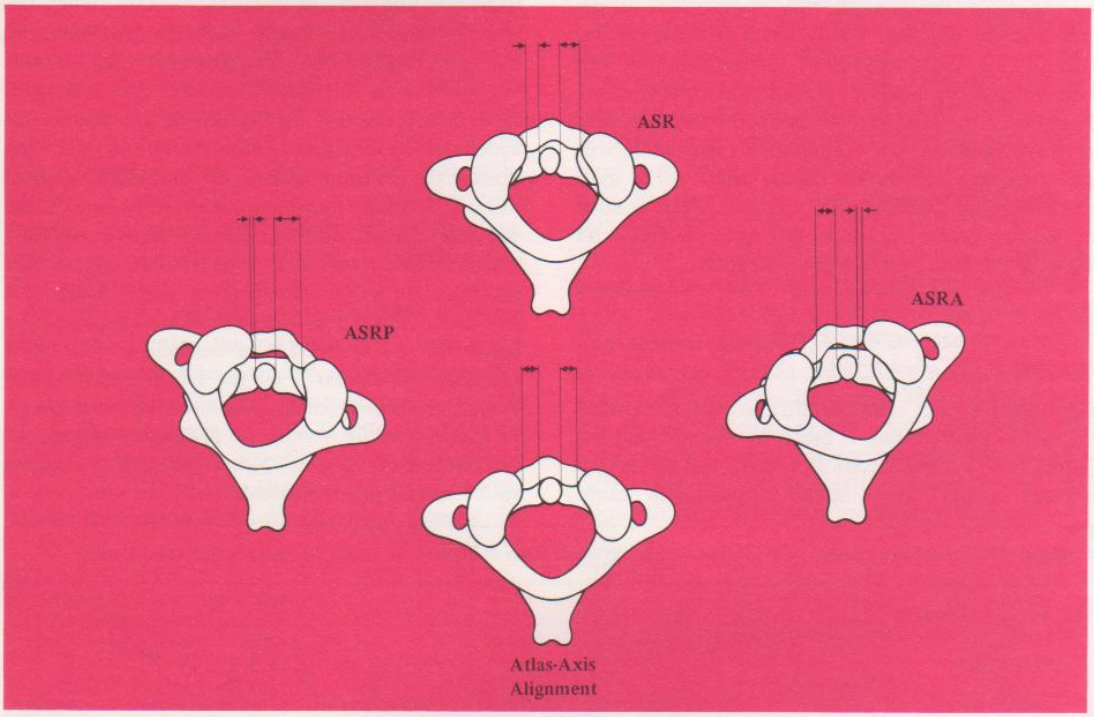


Figure 236: *The Para-odontoid Spaces are Altered By Both Laterality and Rotation.*



arrows which lie between the extended boundaries of the masses.

Figure 233 shows an ASR (or AIR) atlas with rotational misalignment. *As the atlas rotates, the obliquity of the lateral masses is altered in relation to the film so that the anterior mass widens, and the posterior one narrows.* As indicated by the arrows, the image of the lateral mass on the right side has increased in width, while the left lateral mass has narrowed. This would require the listing to be ASRA. If the lateral mass on the side of laterality is rotated posteriorward, then the atlas is listed ASRP. When the widths of the lateral masses are measured on the A–P film, both measurements must be made on the same plane and through the identical portion of each lateral mass, to insure realiability.

There is another method for ascertaining the relative rotation of the atlas lateral masses. This method makes use of the fact that the medial surfaces of the lateral masses are concave, and that the upper portions of these concave surfaces are indented. The combination of the indentations and concave surfaces cause areas of radiolucency to appear on the medial borders of the lateral masses on the A–P film. These relatively dark areas will be of equal width when the atlas is not rotated, as shown by the arrows in the left drawing of figure 234. *As the lateral mass rotates anteriorward, the width of the dark area increases; the radiolucent area becomes narrow on the side of posterior rotation.* These changes are illustrated in figures 234 (right drawing) and 235.

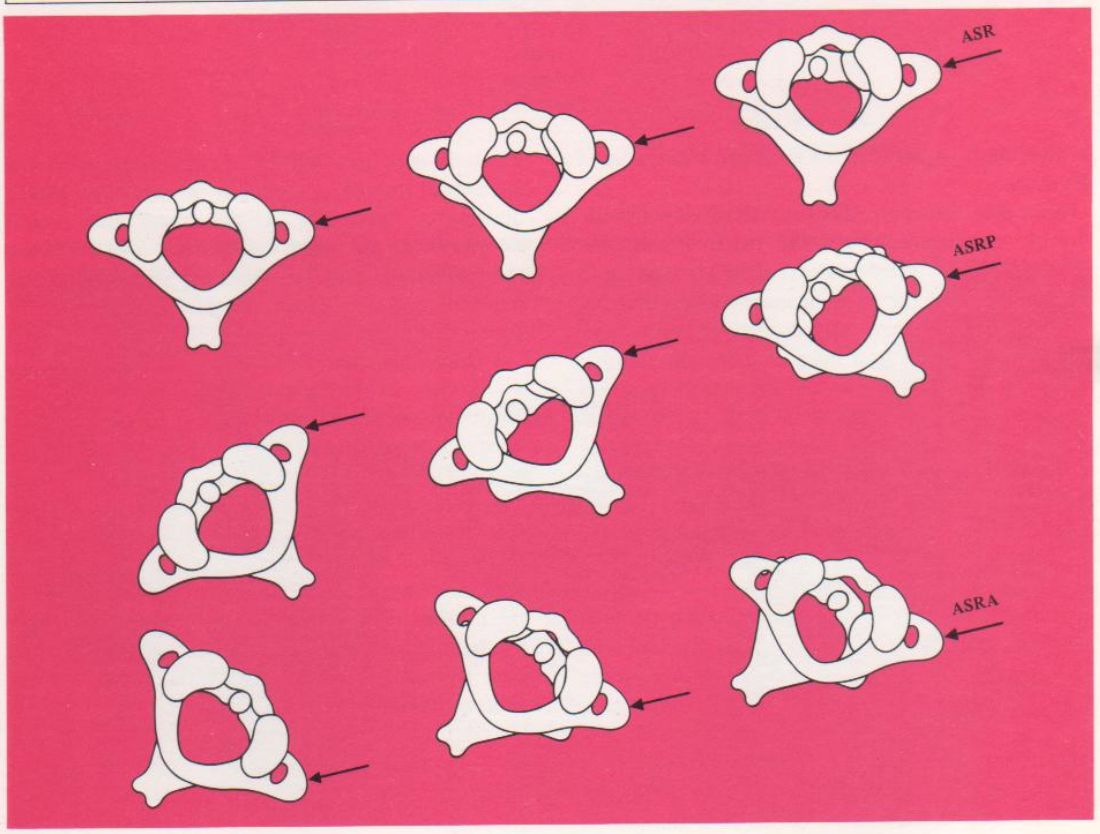
A third indication of atlas rotation is provided by the position of the occiput, as seen on the A–P film. As one of the lateral masses rotates anteriorward, the occipital condyle on that side is lowered toward the plane of the atlas. That is, *the atlas and condyle lines converge toward the side of atlas anterior rotation* (Fig. 230). Since this is so, it must also follow that *the atlas and condyle lines will diverge on the side of atlas posterior rotation.* These rules apply whether the rotation is on the same side of atlas laterality, or on the opposite side. For instance, in figure 231, the atlas and condyle lines converge on the side of the anterior lateral mass, but on the opposite side of laterality (ASRP). Conversely, in figure 230, the two lines converge on the side of the anterior lateral mass, while this is also on the side of atlas laterality (ASRA).

The condyle and atlas relationship will also be affected by factors other than the rotation of atlas. For example, the condyle may compensate for an anatomically deficient leg by being elevated on the side of the short extremity. Malformation of the lateral masses or condyles can also alter the apparent position of the atlas or occiput on the film. Because of these variables, the occiput-atlas realtionship will not provide a sufficiently reliable index to be used exclusively for deciding atlas rotation. Either or both of the two previously mentioned methods should be used for the most accurate determination.

Rotation Obscures Laterality

One might expect atlas laterality to be very obvious on the A–P projection. It might be thought that the spaces between the odontoid process and the lateral masses would reveal lateral displacement quite readily. While it may be true in some instances that the side of the wider space is also the side of atlas laterality, this will not necessarily be true when the atlas is rotated. In figure 236, the para-odontoid spaces are found to be of equal width when the atlas is aligned with the axis. When the atlas undergoes ASR misalignment, the space on the right side widens. However, anterior rotation on the right side, making the listing an ASRA, may diminish this space, making it appear more narrow than the one on the opposite side. In addition, if one were to view the ASRP atlas on the A–P film, it could appear very much like an ASLA misalignment. Axis rotation will also alter the sizes of the para-odontoid spaces. The space will be decreased on the side of axis body rotation, and increased on the side of spinous laterality. For these reasons, *atlas laterality must always be determined by comparing the planes of the atlas and axis on the A–P radiograph*, thereby establishing which lateral mass is elevated.

Figure 237: *Progressive Stages in the Correction of Different Atlas Subluxations, Using the Same Direction of Thrust.*



Repositioning the Atlas

In order to realign the atlas to the axis, the thrust must move the vertebra opposite to the direction in which it has misaligned. The four types of atlas misalignment (anteriority, superiority or inferiority, laterality and rotation) are all reduced with a single thrust on the transverse process. Figure 237 illustrates three progressive stages in the correction of an ASR, ASRP, and ASRA subluxation. Notice that in each drawing, the arrow points in the same direction, driving the atlas slightly anterior to posterior, and from right to left.

Correcting the posterior rotation (ASRP) is accomplished by turning the patient's head toward the *opposite* side of atlas laterality. To correct anterior rotation (ASRA), the head is turned *toward* the side of laterality. In figure 237, the direction in which the axis is pointed agress with how the head should be turned. Actually, the significance of turning the head is only that the position of the axis is changed, for this is what allows the thrust to be given in the same direction to correct both posterior and anterior rotation. Notice that the atlas and axis are totally aligned in the last stage of each series of listings, even though they face in different directions at their completion.

The superior or inferior misalignment of the atlas is corrected by applying *torque* to the thrust in either a clockwise or counterclockwise direction. This rotary force is an integral part of the overall correction, and is applied at the same time the rest of the thrust is delivered.

In figure 238, all of the possible types of atlas subluxations are listed. Summarized in the table are the various misalignment characteristics, with the exception of atlas anteriority, which remains the same for all the listings. Also included is some of the information pertaining to the correction of the subluxations.

In figures 239 through 249, many of the atlas misalignments are shown roentgenographically. Both the lateral and the anteroposterior projections are presented to show how the entire listing is derived.

Figure 238: *The Atlas Listings.*

LISTING	ANTERIORITY	SUPERIORITY OR INFERIORITY	LATERALITY	ROTATION	CONTACT POINT	DIRECTION OF TORQUE
A–R	Yes	None	Right	None	Right Transverse	None
ASR	Yes	Superiority	Right	None	Right Transverse	Clockwise
AIR	Yes	Inferiority	Right	None	Right Transverse	Counterclockwise
A–RA	Yes	None	Right	Anterior	Right Transverse	None
ASRA	Yes	Superiority	Right	Anterior	Right Transverse	Clockwise
AIRA	Yes	Inferiority	Right	Anterior	Right Transverse	Counterclockwise
A–RP	Yes	None	Right	Posterior	Right Transverse	None
ASRP	Yes	Superiority	Right	Posterior	Right Transverse	Clockwise
AIRP	Yes	Inferiority	Right	Posterior	Right Transverse	Counterclockwise
A–L	Yes	None	Left	None	Left Transverse	None
ASL	Yes	Superiority	Left	None	Left Transverse	Counterclockwise
AIL	Yes	Inferiority	Left	None	Left Transverse	Clockwise
A–LA	Yes	None	Left	Anterior	Left Transverse	None
ASLA	Yes	Superiority	Left	Anterior	Left Transverse	Counterclockwise
AILA	Yes	Inferiority	Left	Anterior	Left Transverse	Clockwise
A–LP	Yes	None	Left	Posterior	Left Transverse	None
ASLP	Yes	Superiority	Left	Posterior	Left Transverse	Counterclockwise
AILP	Yes	Inferiority	Left	Posterior	Left Transverse	Clockwise

Figure 239: *Atlas Listing, ASL.*

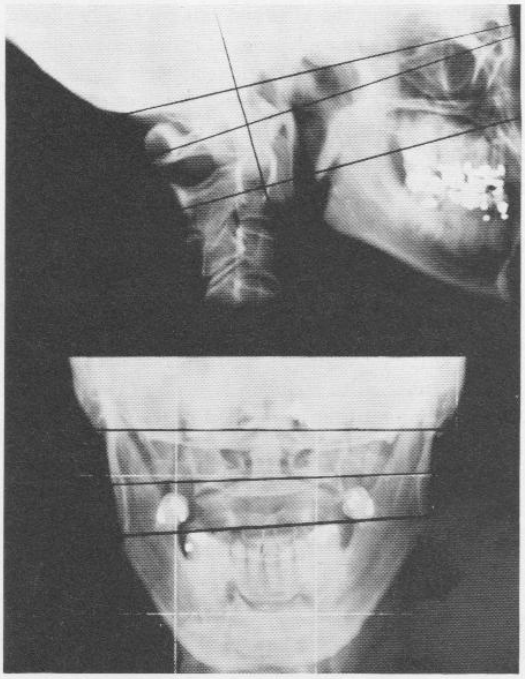


Figure 240: *Atlas Listing, A–R.*

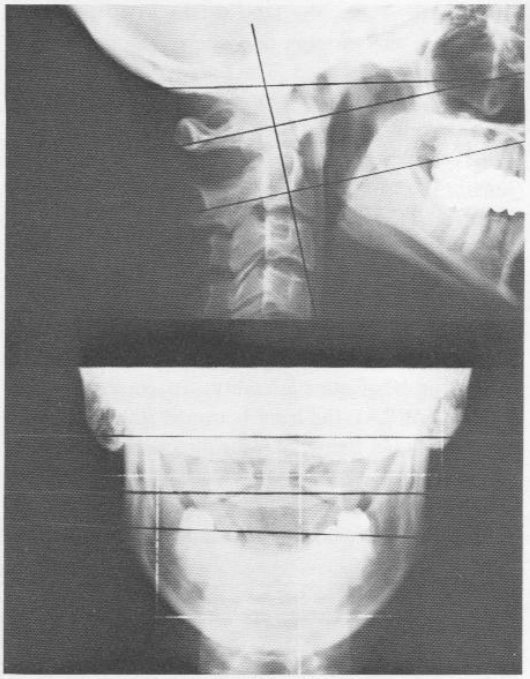


Figure 241: *Atlas Listing, ASRS; The Occiput is Compensating for 17mm. of Anatomical Deficiency of the Right Leg. (Not Shown).*

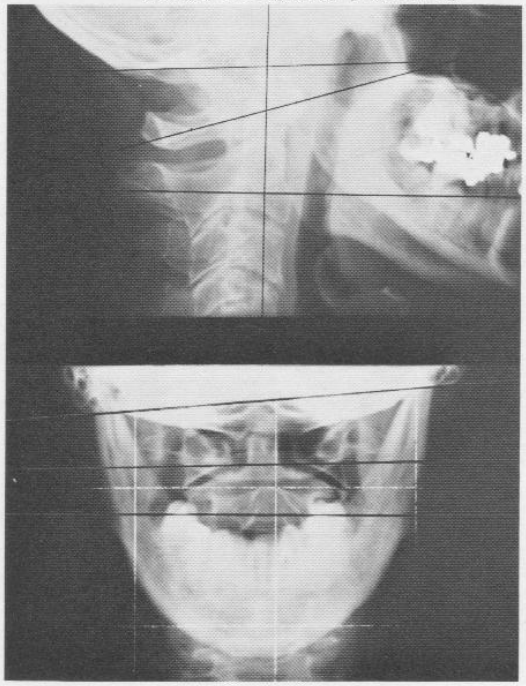


Figure 242: *Atlas Listing, ASLP.*

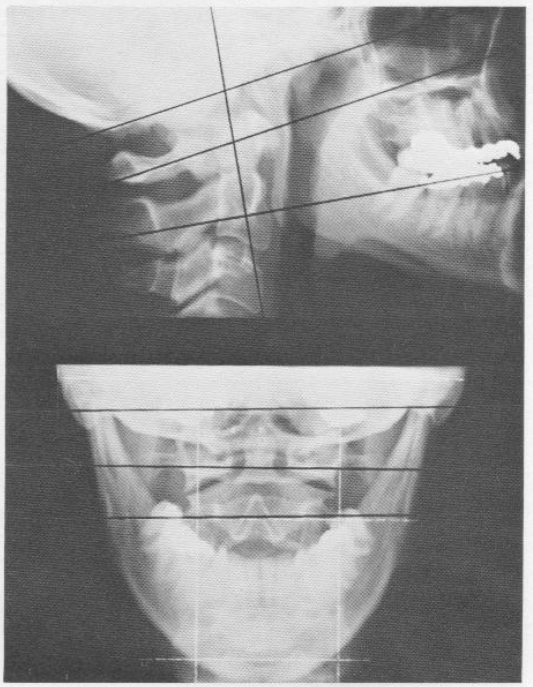


Figure 243: *Atlas Listing, A–LA.*

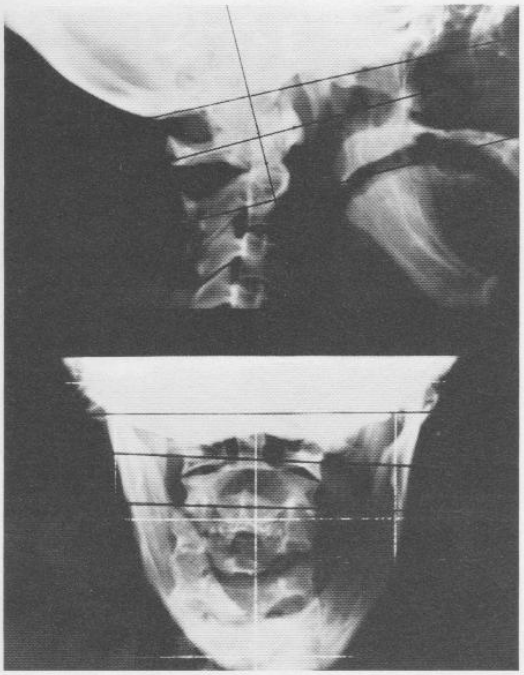


Figure 244: *Atlas Listing, ASLA.*

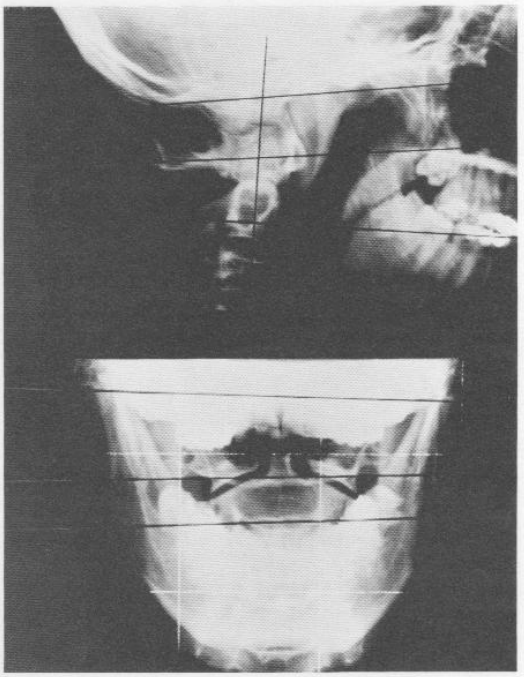


Figure 245: *Atlas Listing, AIRA.*

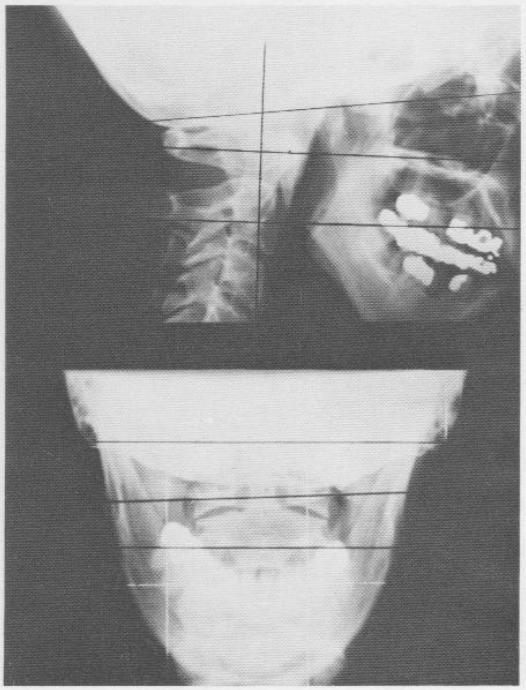


Figure 246: *Atlas Listing, ASRP.*

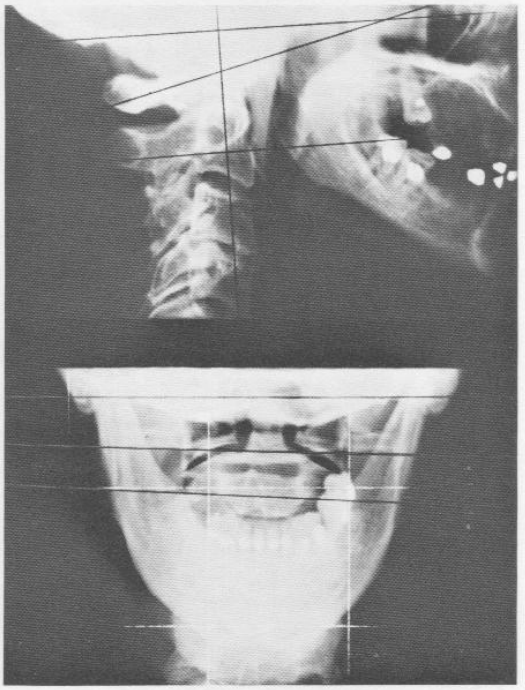


Figure 247: *Atlas Listing, ASRP.*

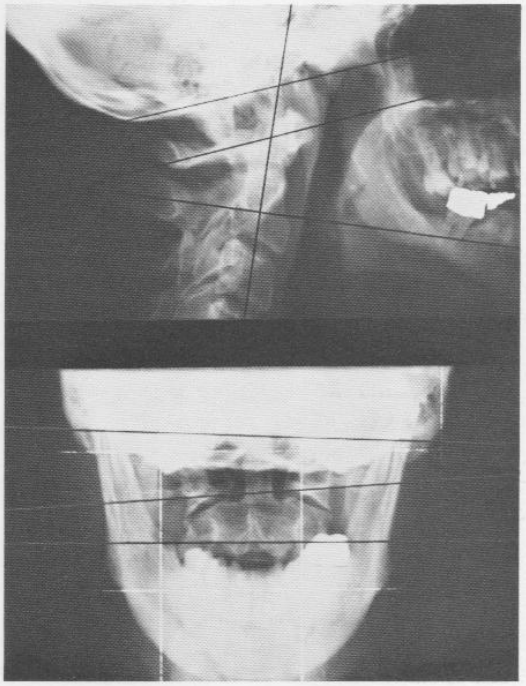


Figure 248: *Atlas Listing, AIR.*

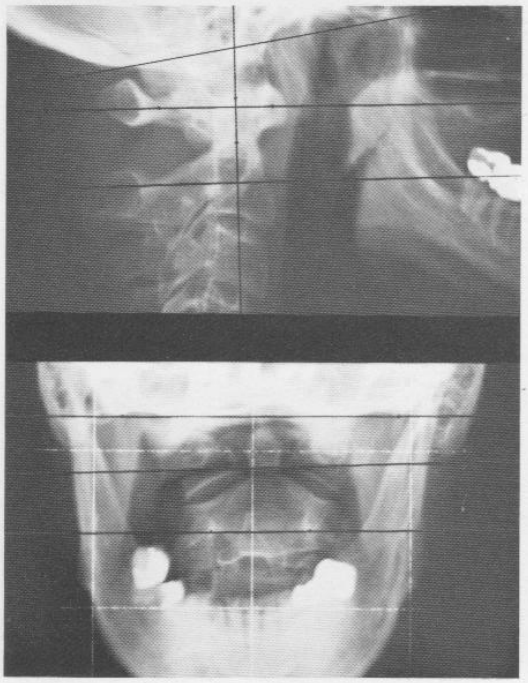
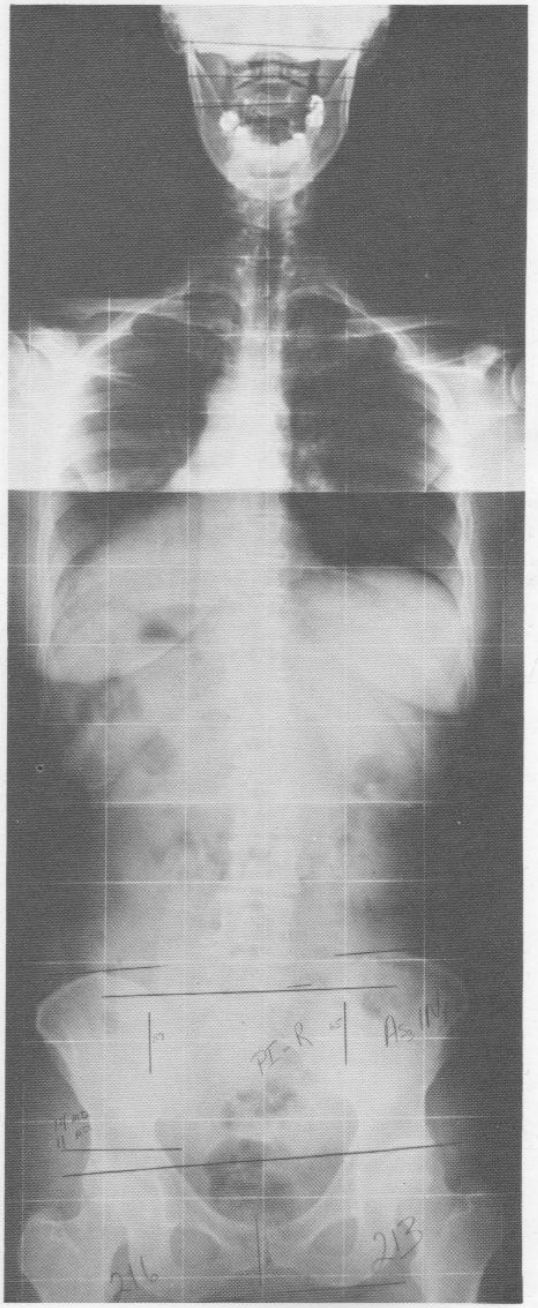


Figure 249: *Apparent Atlas Listing, ASLA; However, the Axis is Rotated to the Left (PL), as are All the Vertebrae, Due to a PI–R Sacrum. The Atlas is Actually an ASLP, and Would Appear So If the Axis Was Centered By Correcting the Sacrum. Occiput Compensating for Left Leg Deficiency, as well as for ASLP Atlas.*



Occipital Condyle Misalignments

Atlanto-occipital Alignment

The occiput and atlas are optimally aligned when there is maximum patency through the portion of the spinal canal formed by the vertebral foramen of the atlas, and the foramen magnum of the occiput. This condition can exist only when the plane of the foramen magnum and the A–P atlas plane are parallel. In figure 250, two dots have been placed on the external, inferior surface of the occiput. The dots are put on the flat, straight surface of the occiput that lies immediately behind the condyles on the lateral film. The anterior dot should be placed at the point where the flat surface and the posterior portion of the condyles are joined. The posterior dot is placed where the flat surface meets the curved external surface of the squama. The line through these dots represents the A–P plane of the foramen magnum, and is designated the "foramen magnum line". *When the foramen magnum line and the A–P atlas plane line are parallel, there is optimal alignment between the occiput and atlas.*

There is another way to evaluate the alignment between the occiput and atlas. Dots are placed at the anterior and posterior boundaries of the condyles, as shown in figure 251. A line is drawn through these points, and is designated the "A–P condyle line". *When the occiput and atlas are in alignment, an angle of approximately five degrees will be formed between a line drawn perpendicularly to the A–P condyle line, and a line drawn perpendicularly to the A–P atlas plane line.* Since the atlas and axis are aligned in figure 251, the line drawn perpendicularly to the A–P atlas plane line can be protrayed as the odontoid line.

This latter method may be substituted for the one previously described, especially when the floor of the

Figure 250: *The Aligned Occiput, Viewed Laterally.*

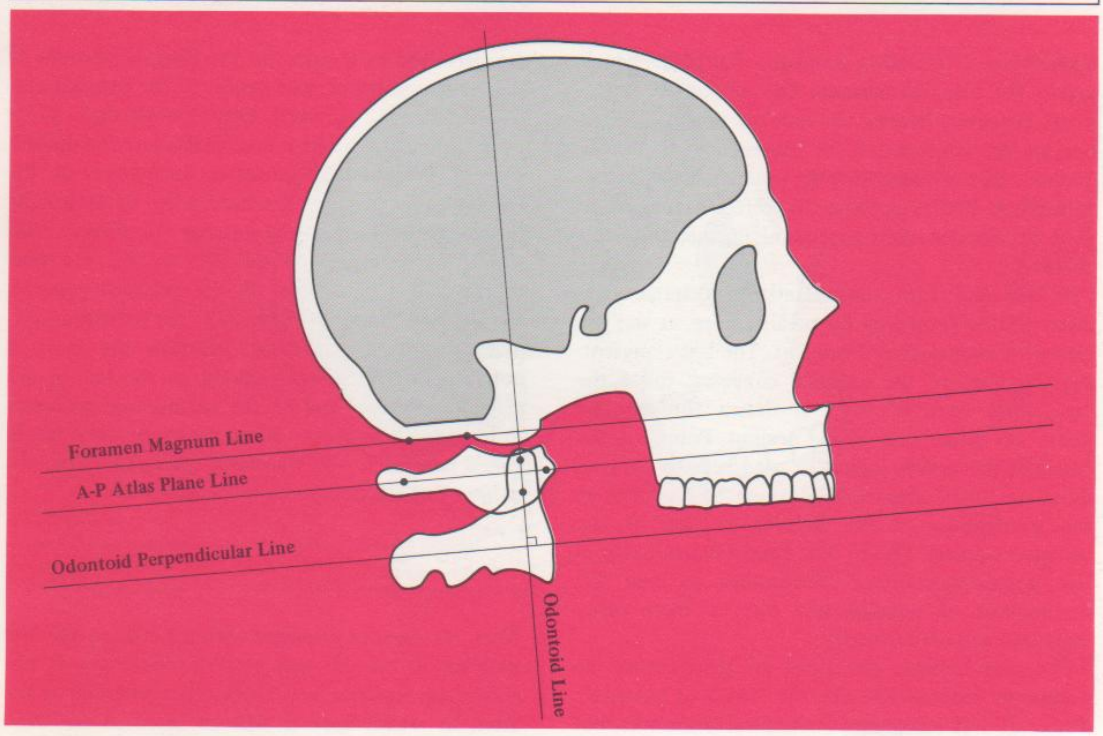
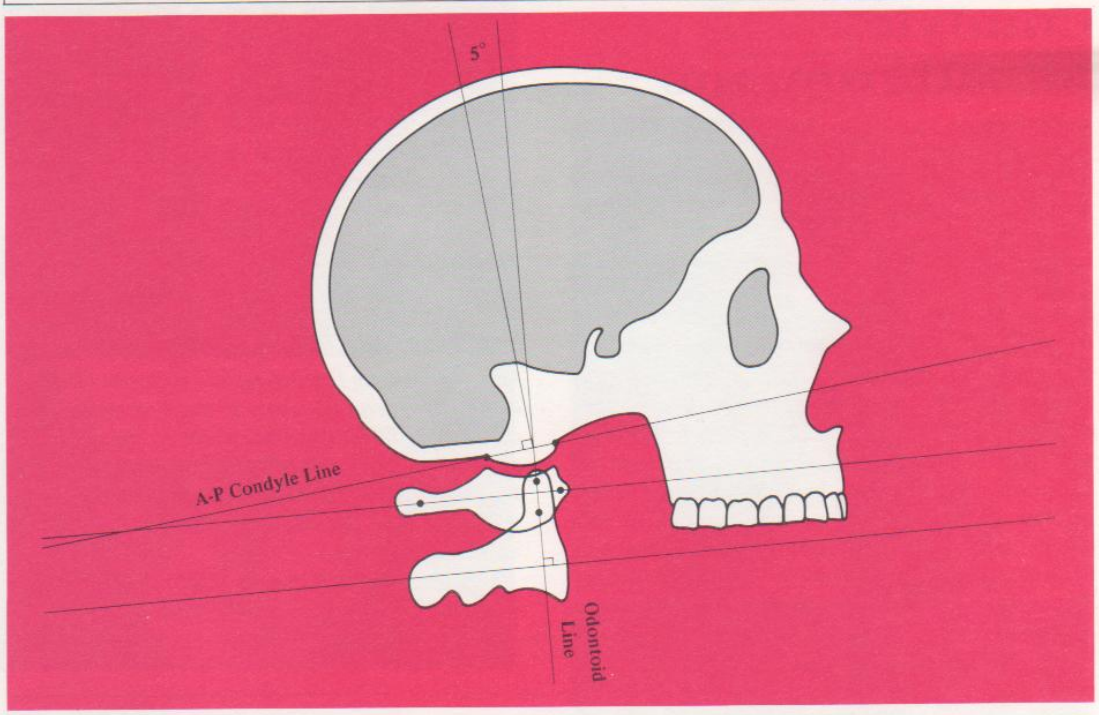


Figure 251: *A Perpendicular to the A–P Condyle Line Forms a Five Degree Angle With the Odontoid Line When the Occiput is Aligned.*



occiput is not formed in a straight, flat plane, which makes the foramen magnum line difficult to determine. However, because the mastoid processes often obscure the condyles on the lateral film, the former method, that of comparing the foramen magnum line with the A–P atlas plane line, is preferred, and will be used to describe the occipital misalignments in this chapter.

On the A–P film, optimal atlanto-occipital alignment will be protrayed by parallel lines, as was the case with atlanto-axial alignment. The line representing the level of the occipital condyles, called the "transverse condyle line", is drawn through like points on either side of the occiput. Points on the condyles themselves cannot be used because the condyles are almost always obscured on the A–P film by the overlapping of the inferior portion of the occipital squama. (Note: The condyles are shown in the semidiagrammatic illustrations so that the mechanisms of misalignment can be more easily visualized and understood.)

The most reliable structures for representing the transverse condyle line are the "mastoid notches". These are not recognized anatomical landmarks, but are perceived as grooves on the mastoid portions of the termporal bones, just medial to the mastoid processes. (Fig. 252, arrows). Other points that can be used, although somewhat less reliably, are the inferior tips of the mastoid processes themselves, or the "paramastoid processes", which, when developed, lie just medial to the mastoid notches. All of these areas should be examined on the film so that the most representative plane line for the occipital condyles can be determined. In figure 252, the transverse condyle line is shown drawn through the mastoid notches. Dots have been placed on the tips of the mastoid processes and on the paramastoid processes to identify these points. *When the transverse condyle line is parallel to the transverse atlas plane line, the occiput and atlas are in optimal alignment.*

"AS" or "PS" Misalignment

When the occiput misaligns with the atlas, it will first misalign in one of two possible directions. It can either slip anterior and superior, in relation to the atlas, in which case it will be listed as an "AS"

Figure 252: *Optimal Occiput-Atlas Alignment in the Reversed Anteroposterior View.*

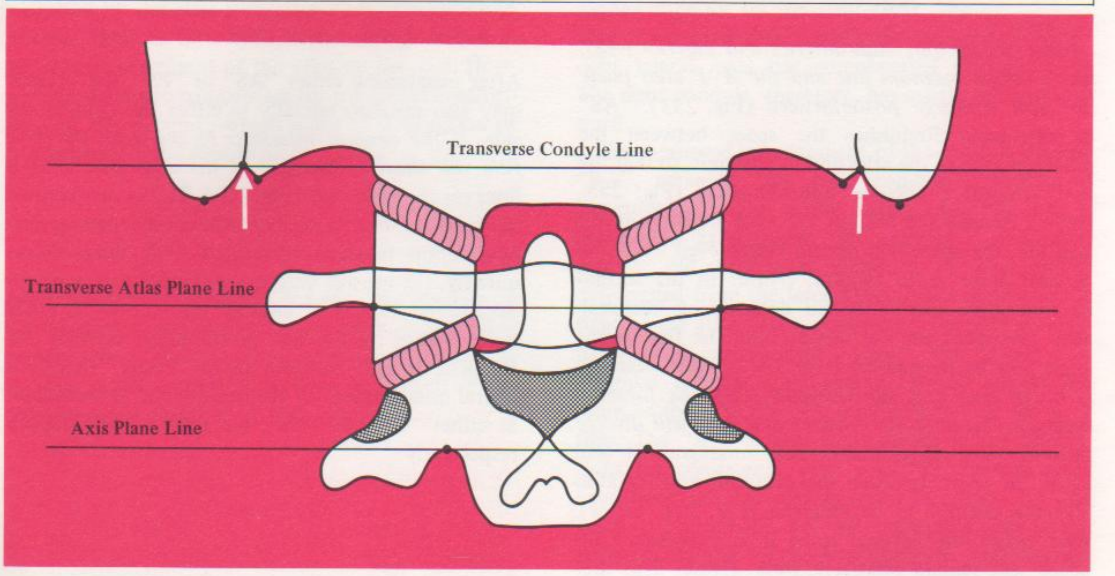
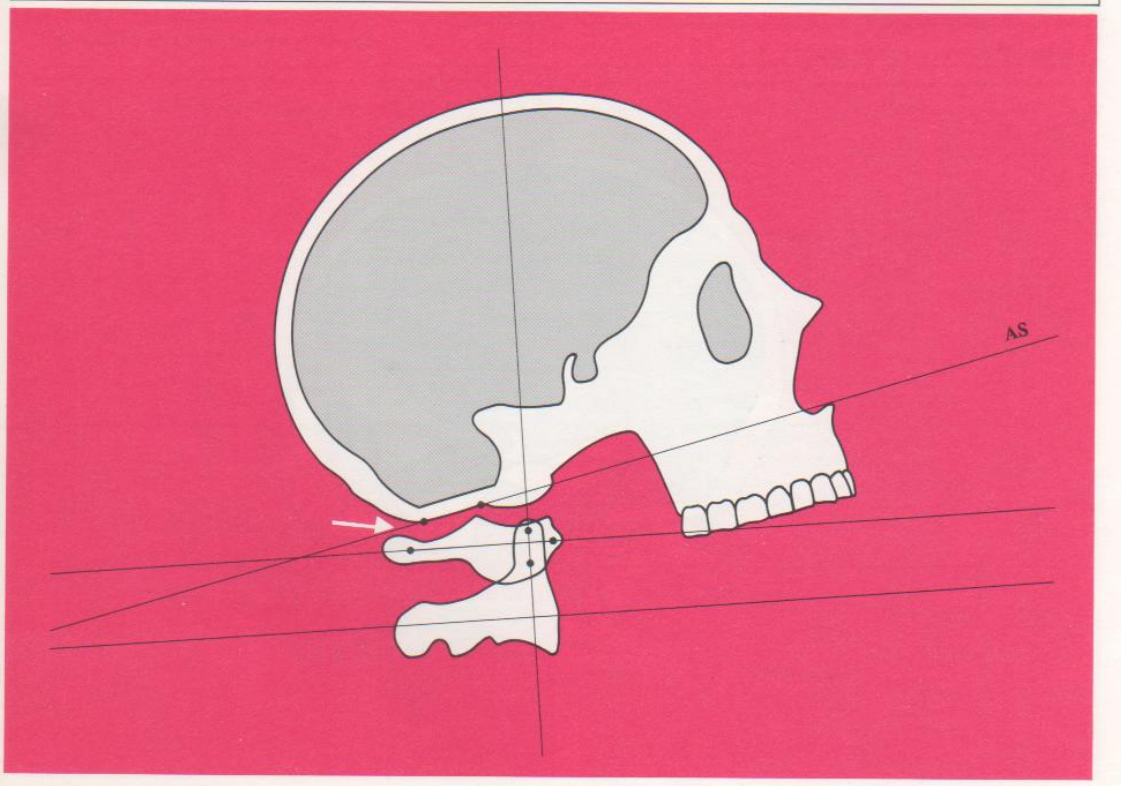


Figure 253: *The "AS" Occiput.*



occiput; or, it can misalign posterior and superior in relation to the atlas, which will qualify it as a "PS" occiput.

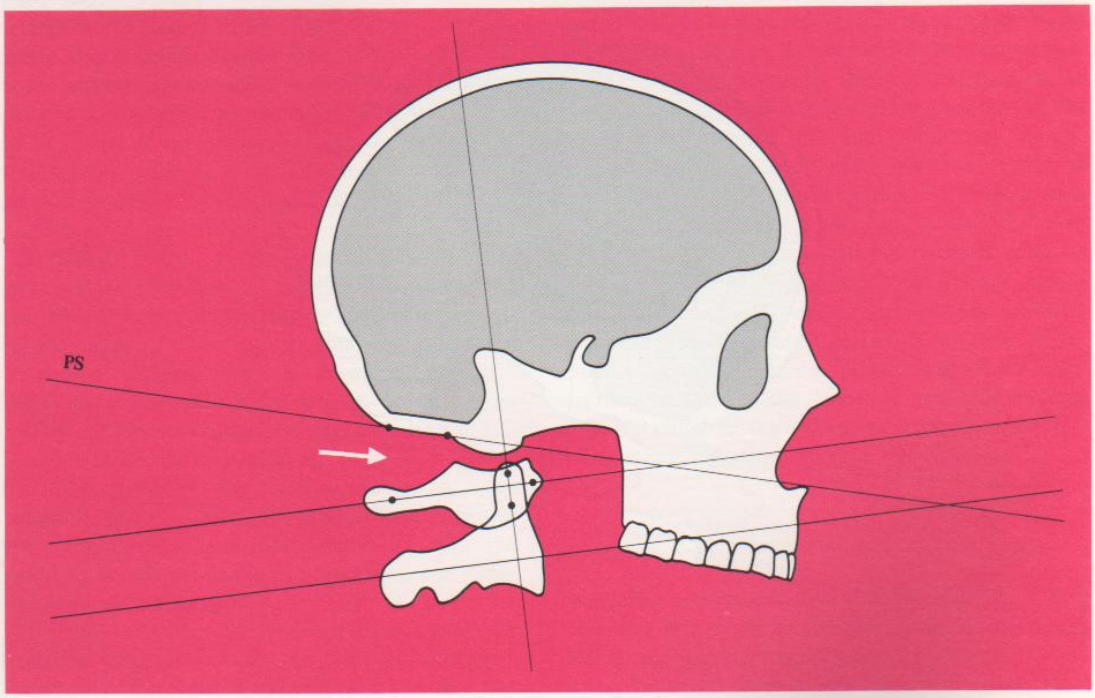
When the occiput slips anterior and superior (AS), the foramen magnum line and the A–P atlas plane line will converge posteriorward (Fig. 253). "AS" misalignment diminishes the space between the posterior arch of the atlas and the occiput, so that the two structures become approximated (Fig. 253, arrow). Because the occiput and atlas are fixed in this position, the space will remain closed even when the cervical spine is in flexion. (Note: In the second method given previously for determining occipital-atlas alignment on the lateral film, the five degree angle will be increased.) *When the occiput misaligns posteriorward and superiorward (PS), the foramen magnum line and A–P atlas plane line will diverge posteriorward* (Fig. 254). This misalignment will cause the space between the posterior arch of atlas and the occiput to be enlarged (Fig. 254, arrow). Even when the cervical spine is in extension, this space will remain relatively wide. (Note: This misalignment will decrease the five degree angle in the second method referred to above.)

Lateral Misalignment

After misaligning either "AS" or "PS", the occiput may also misalign laterally to either the right or left side. *If the occiput misaligns to the right, the A–P film will show a diverging of the atlas and condyle lines on the right side* (Fig. 255). This occurs because the right capsular ligament of the condyle-lateral mass articulation becomes infiltrated with fluid. Consequently, the capsule becomes distended and raises the occiput on that side. Because the occiput is raised superiorward on the side of laterality, *superior* misaligment is also included in the listing. Therefore, lateral misalignment of the occiput will be designated as either "RS" or "LS", for right or left sideslip, respectively.

Since it is extremely rare that both the atlas and occiput are subluxated together in any given patient, one would almost always expect to find the atlas and axis lines parallel on the A–P film whenever the occiput is involved (Fig. 255). It might be thought that the atlas will compensate for an occipital subluxa-

Figure 254: *The "PS" Occiput.*



tion by wedging with the axis on the A–P film. This does not occur because the principle type of motion permitted by the atlas is rotation about the odontoid process. There is very little lateral tilting motion in the normal movement of the atlas on the axis. However, the atlas *will* compensate for rotational misalignment of the occiput, which is the next direction of misalignment to be described.

Rotational Misalignment

After the occiput misaligns laterally, the condyle on the misaligned side may rotate either anteriorward or posteriorward. This causes the atlas to compensate by rotating in the opposite direction. As a result of this compensatory rotation by the atlas, *the rotation of the condyle can be deduced by comparing the widths of the lateral masses. When the lateral mass on the side of occiput laterality is more narrow than the lateral mass on the opposite side, the condyle is rotated anteriorward. When the lateral mass on the side of occiput laterality is wider than the lateral mass on the opposite side, the condyle is rotated posteriorward.*

In figure 256, for example, the condyle is misaligned superior on the right (RS). The right lateral mass is narrower than the left one, indicating that the right lateral mass has compensated posteriorward. The right condyle, therefore, has misaligned anteriorward.

The rotational misalignment of the condyle is listed "RA", meaning "the right condyle is misaligned anteriorward". The entire listing, AS–RS–RA, is interpreted as meaning "the occiput is misaligned anterior and superior in relation to the atlas, and as determined from the lateral film; it has slipped to the right of the atlas, and superiorward; the right condyle has rotated anteriorward". (Note: The PS–RS–RA occipital condyle misalignment would appear the same as the AS–RS–RA misalignment on the A–P film. The "AS" listings were chosen in the illustrations for consistency only, and "PS" listings could have been selected just as well.) In figure 257, the occiput is listed AS–RS–RP, showing a wide lateral mass on the side of occipital laterality. This signifies that the condyle has rotated posteriorward on the right side (RP).

Figure 255: *Occiput Misaligned AS–RS.*

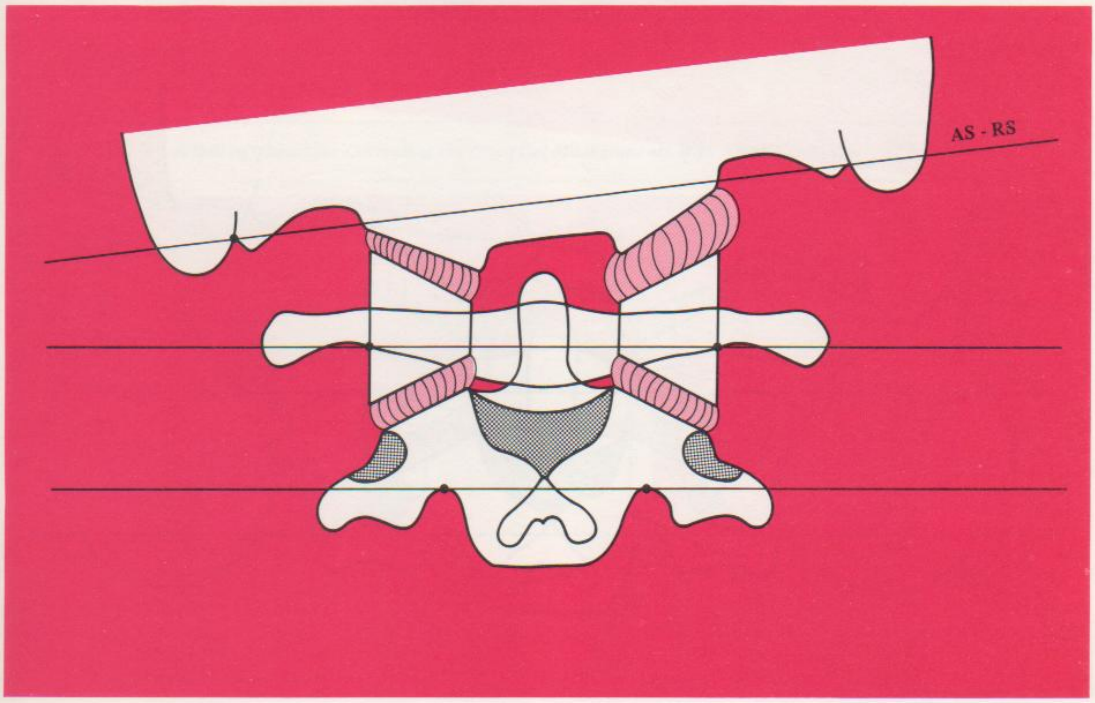


Figure 256: *Occiput Misaligned AS–RS–RA.*

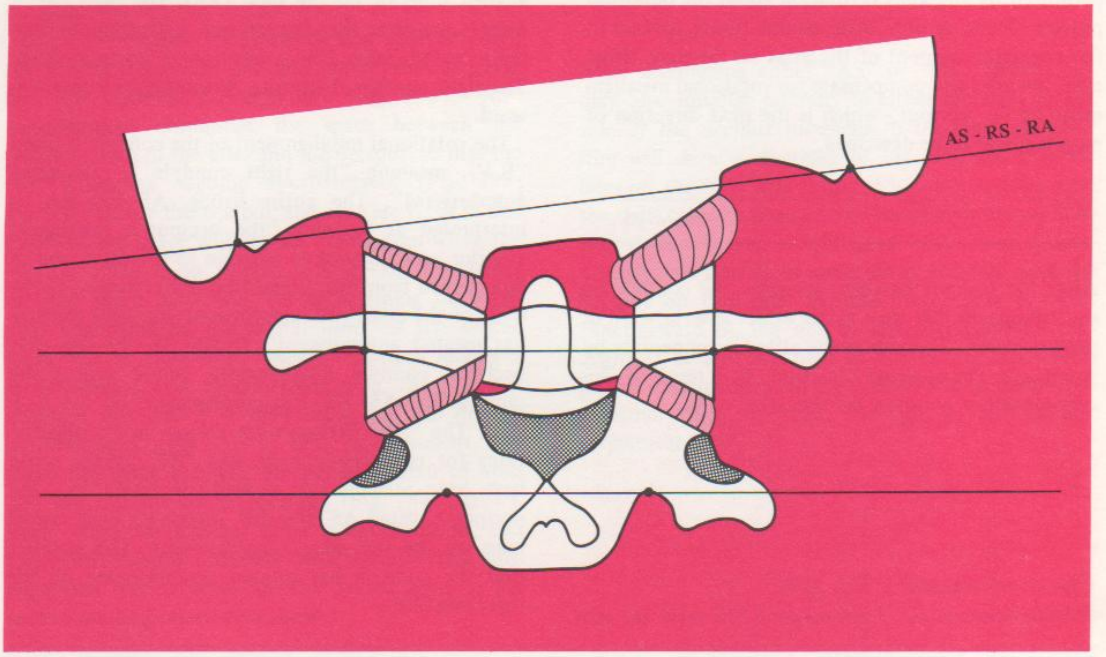
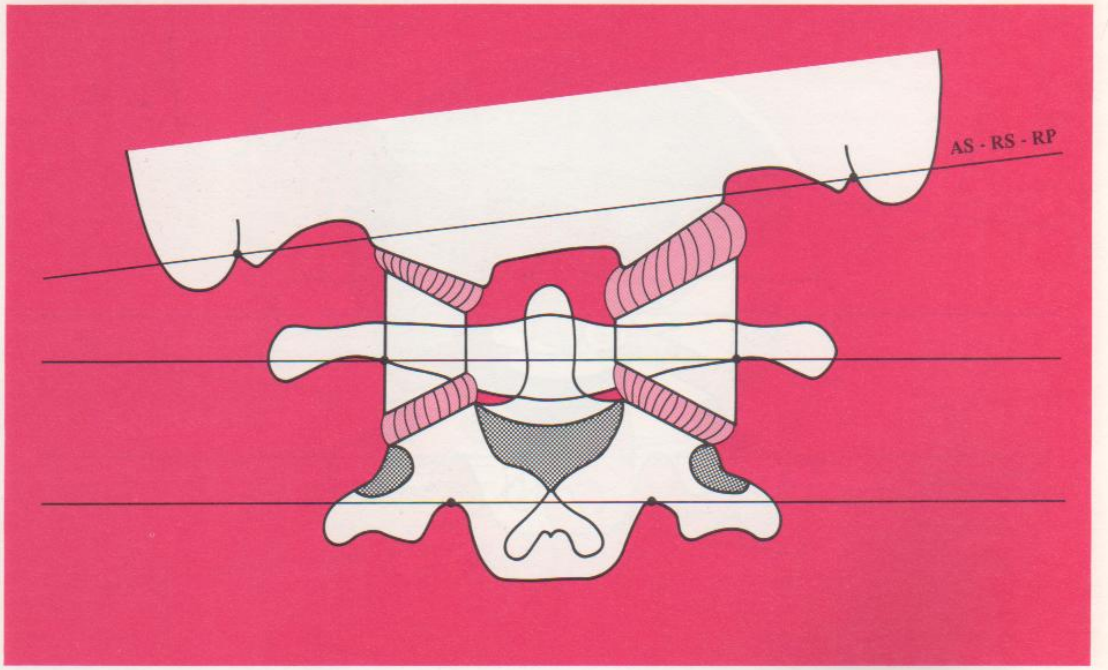


Figure 257: *Occiput Misaligned AS–RS–RP.*



Repositioning the Occiput

All "posterior" occipital subluxations, that is, those which begin with a "PS" listing, are corrected with a thrust that drives the occiput anteriorward and inferiorward (Fig. 258). "Anterior" occiputs are corrected by a thrust which repositions the occiput in the posterior and inferior directions, to correct the "AS" component of the misalignment (Fig. 258).

The same thrust that corrects the "PS" or "AS" factors also reduces the occipital laterality and rotation. In figure 259, the arrows indicate the direction of thrust, as well as the area of contact for correcting occipital subluxations with right laterality. *For "posterior" occiputs, the point of contact is on the temporal bone behind the ear. "Anterior" occiputs are contacted on the glabella of the frontal bone.*

As is true with atlas subluxations, the head is turned *toward* the side of lateral misalignment when anterior rotation exists, and to the *opposite* side of laterality for posterior rotation. This allows the thrust to be

Figure 258: *Direction of Thrust for Correcting "AS" and "PS" Occipital Misalignments.*

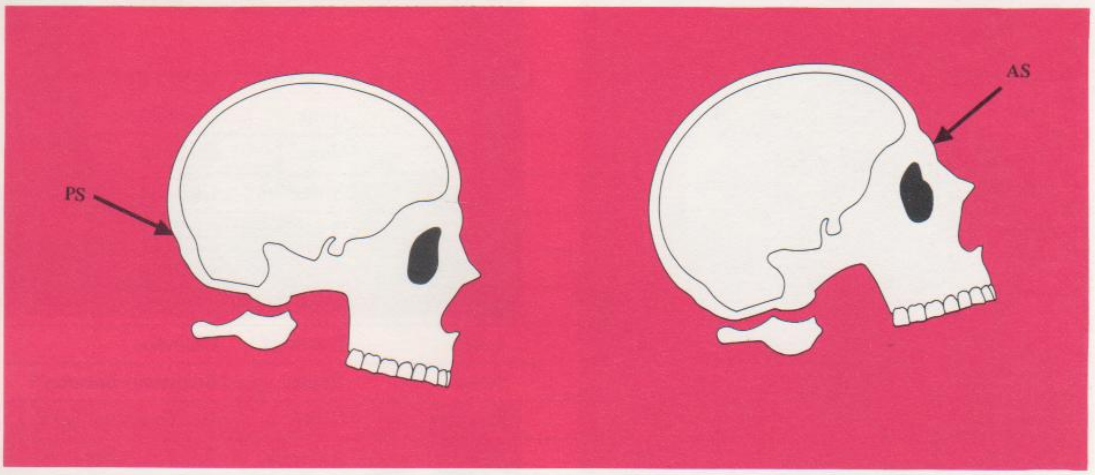
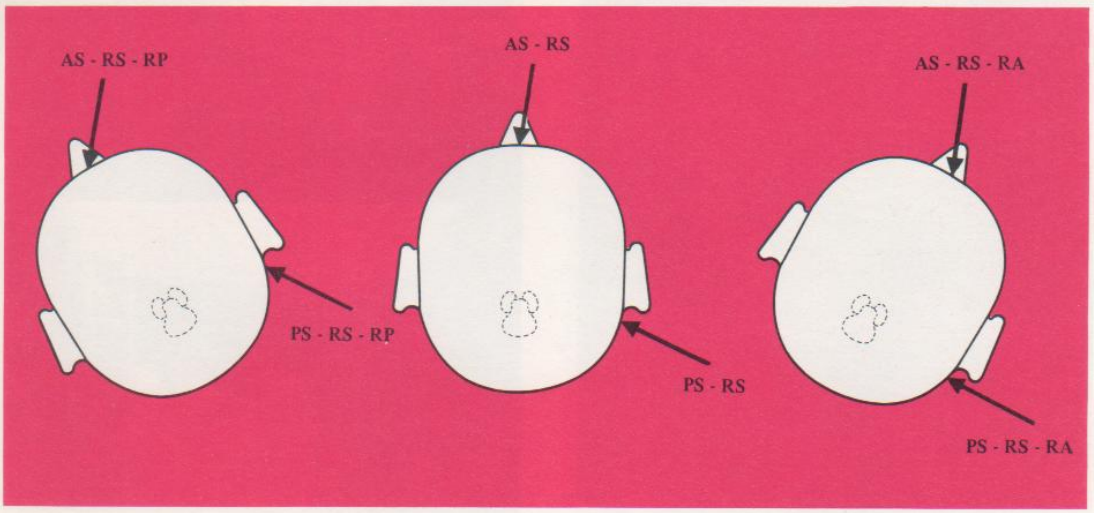


Figure 259: *Direction of Thrust for Correcting the Occipital Misalignments With Right Laterality.*



given in the same direction, whether the condyle is rotated anteriorward, posteriorward, or not at all (Fig. 259, arrows).

Figure 260 shows a table of the various occipital listings. Included are the characteristics of the misalignment factors, and information relating to correcting the subluxations.

In figures 261 through 275, some of the occipital listings are represented radiographically. In addition, a series of lateral films of an "anterior" occiput are presented, in various stages of progress, from severe misalignment ot complete correction.

Figure 260: *The Occipital Listings.*

LISTING	ANTERIORITY OR POSTERIORITY	SUPERIORITY	LATERALITY	ROTATION	CONTACT POINT
AS	Anteriority	Yes	None	None	Glabella
AS–RS	Anteriority	Yes	Right	None	Glabella
AS–RS–RA	Anteriority	Yes	Right	Anterior	Glabella
AS–RS–RP	Anteriority	Yes	Right	Posterior	Glabella
AS–LS	Anteriority	Yes	Left	None	Glabella
AS–LS–LA	Anteriority	Yes	Left	Anterior	Glabella
AS–LS–LP	Anteriority	Yes	Left	Posterior	Glabella
PS	Posteriority	Yes	None	None	Temporal Bones
PS–RS	Posteriority	Yes	Right	None	Rt. Temporal Bone
PS–RS–RA	Posteriority	Yes	Right	Anterior	Rt. Temporal Bone
PS–RS–RP	Posteriority	Yes	Right	Posterior	Rt. Temporal Bone
PS–LS	Posteriority	Yes	Left	None	Lt. Temporal Bone
PS–LS–LA	Posteriority	Yes	Left	Anterior	Lt. Temporal Bone
PS–LS–LP	Posteriority	Yes	Left	Posterior	Lt. Temporal Bone

Figure 261: *Occiput Listing, PS–RS.*

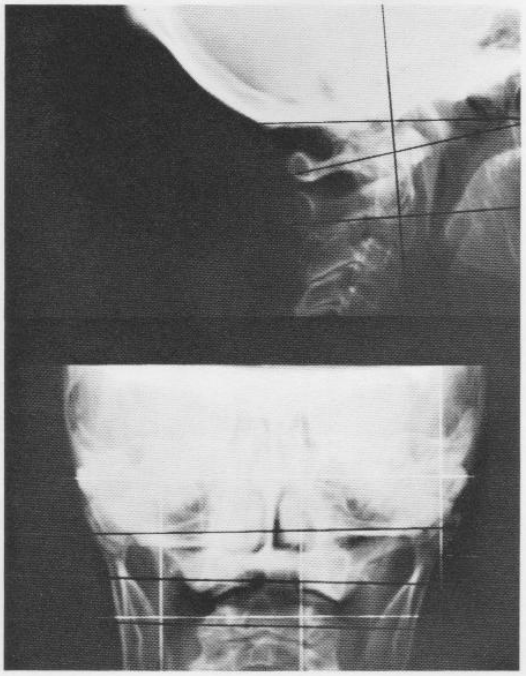


Figure 262: *Occiput Listing, AS–LS.*

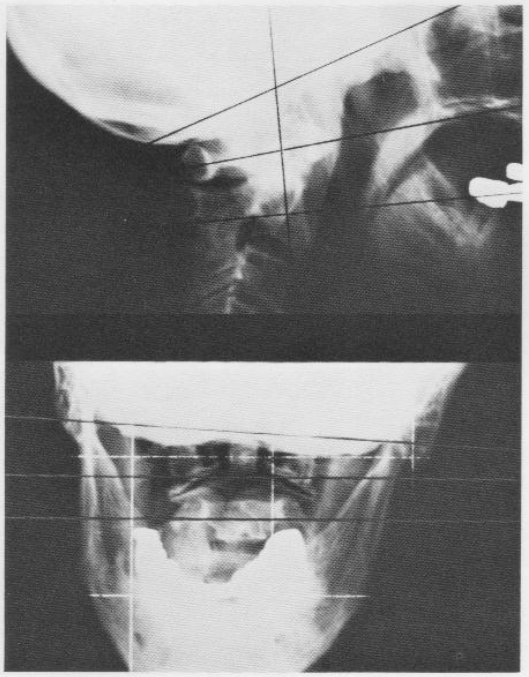


Figure 263: *"Anterior" Occiput of a Child, Listed AS–RS–RA.*

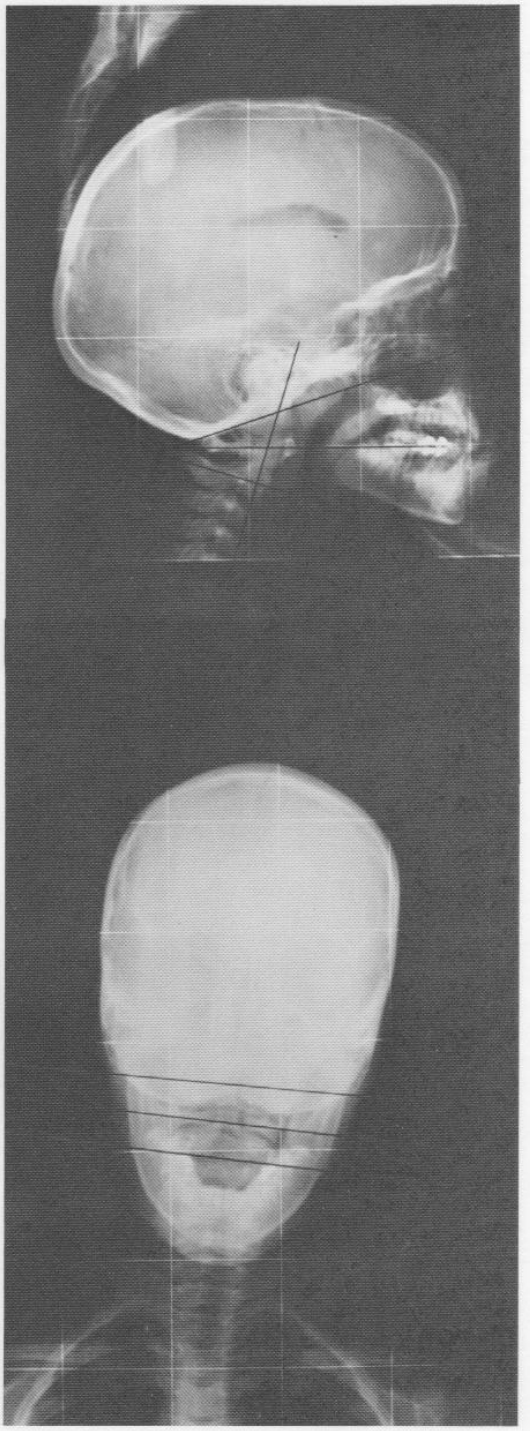


Figure 264: *Occiput Listing, AS–RS.*

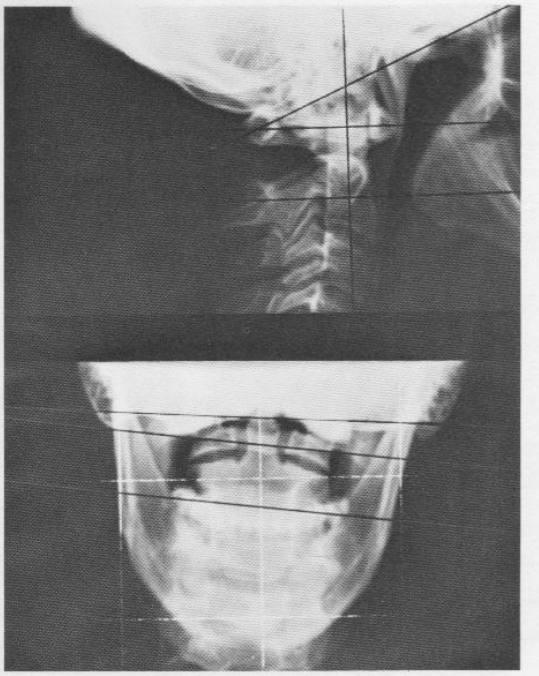


Figure 265: *Occiput Listing, PS–LS–LP.*

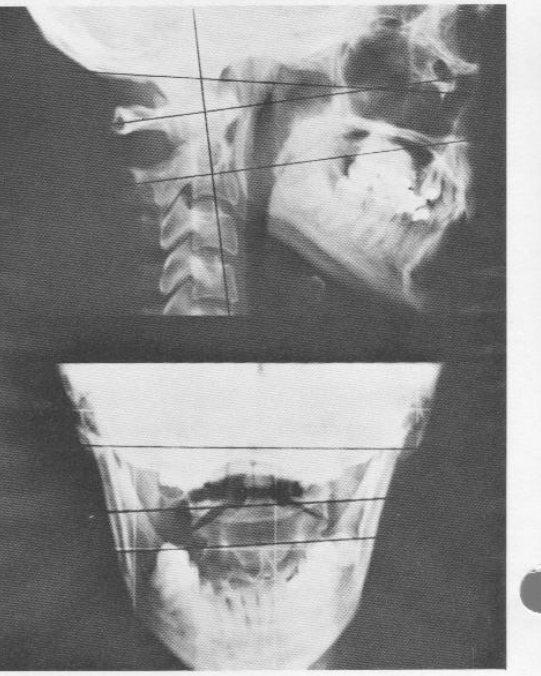


Figure 266: *Occiput Listing, PS–RS–RA.*

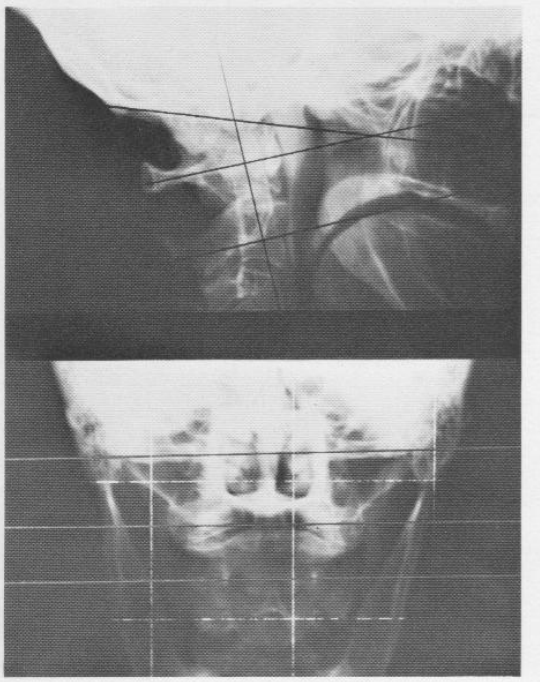


Figure 267: *Occiput Listing, PS–LS–LA.*

Figure 268: *Occiput Listing, PS–RS–RP.*

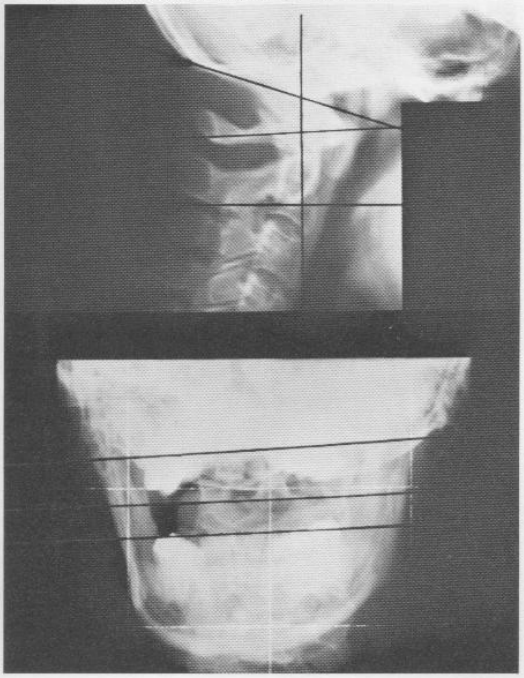


Figure 269: *Occiput Listing, PS–LS–LA.*

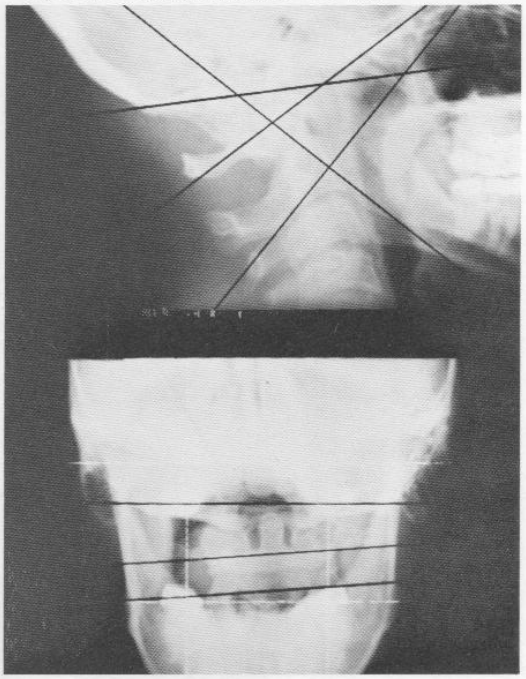


Figure 270: *Occiput Listing, PS–LS–LP.*

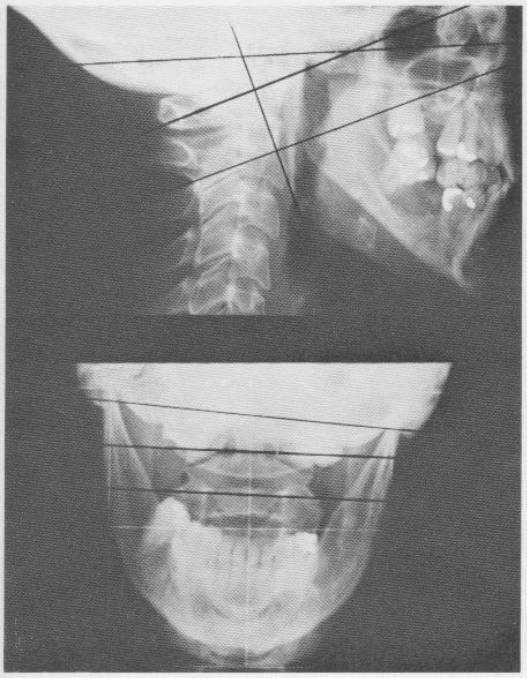


Figure 271: *Occiput Listing, PS–LS–LP.*

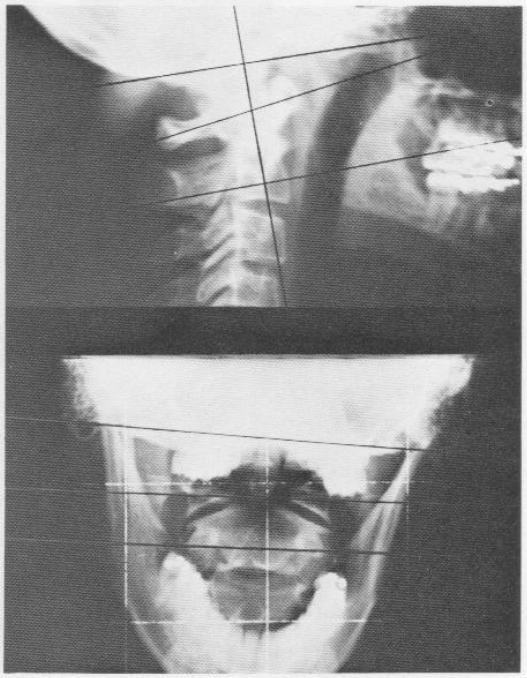


Figure 272: *Severe "Anterior" Occiput (AS).*

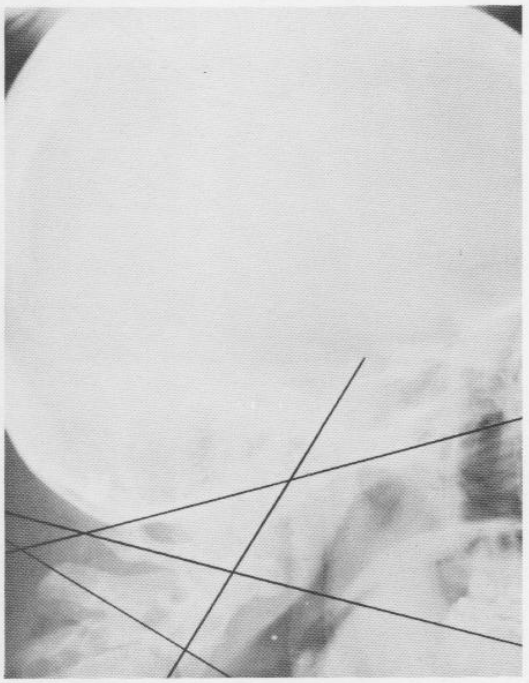


Figure 273: *Same Case as Figures 272-275; "Anterior" Occiput Partially Corrected.*

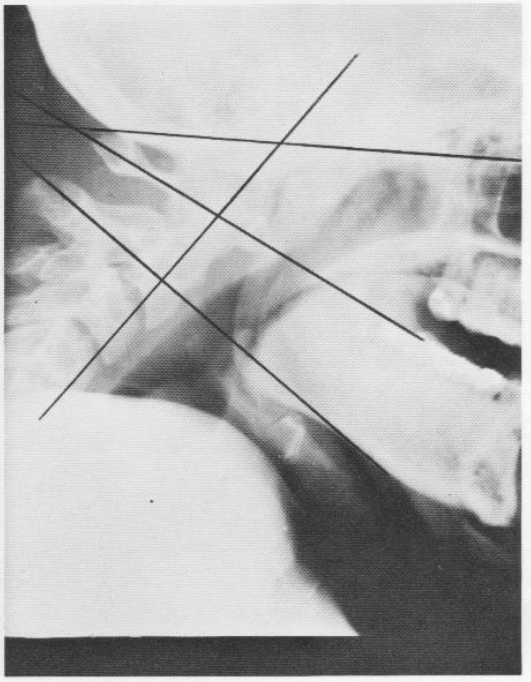


Figure 274: *Same Case as Figures 272-275; "Anterior" Occiput Nearly Corrected.*

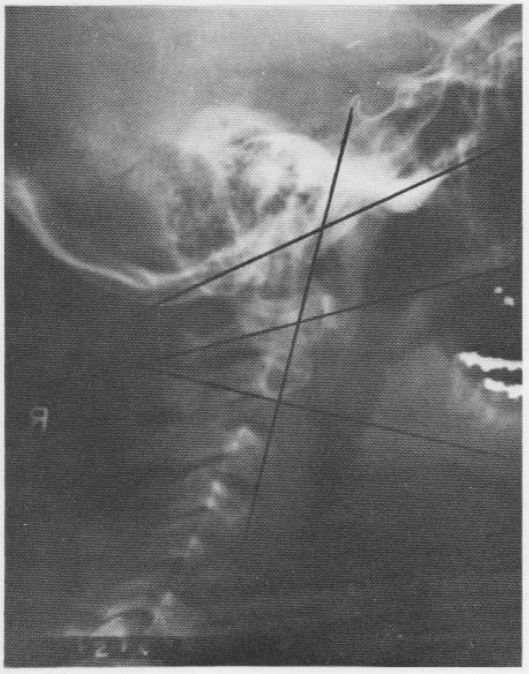
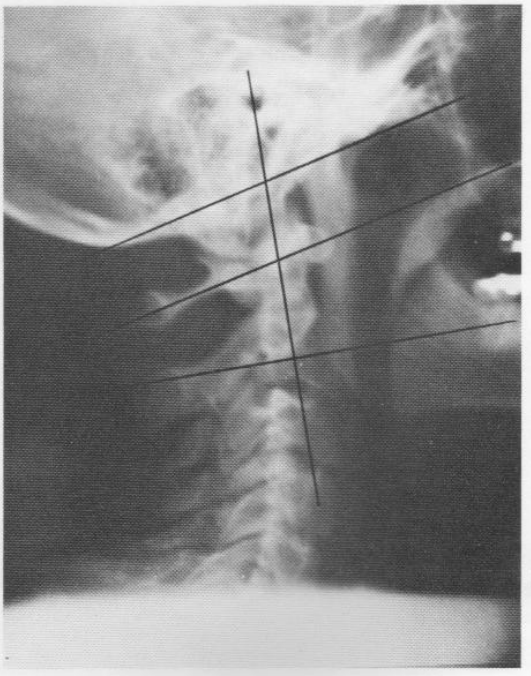
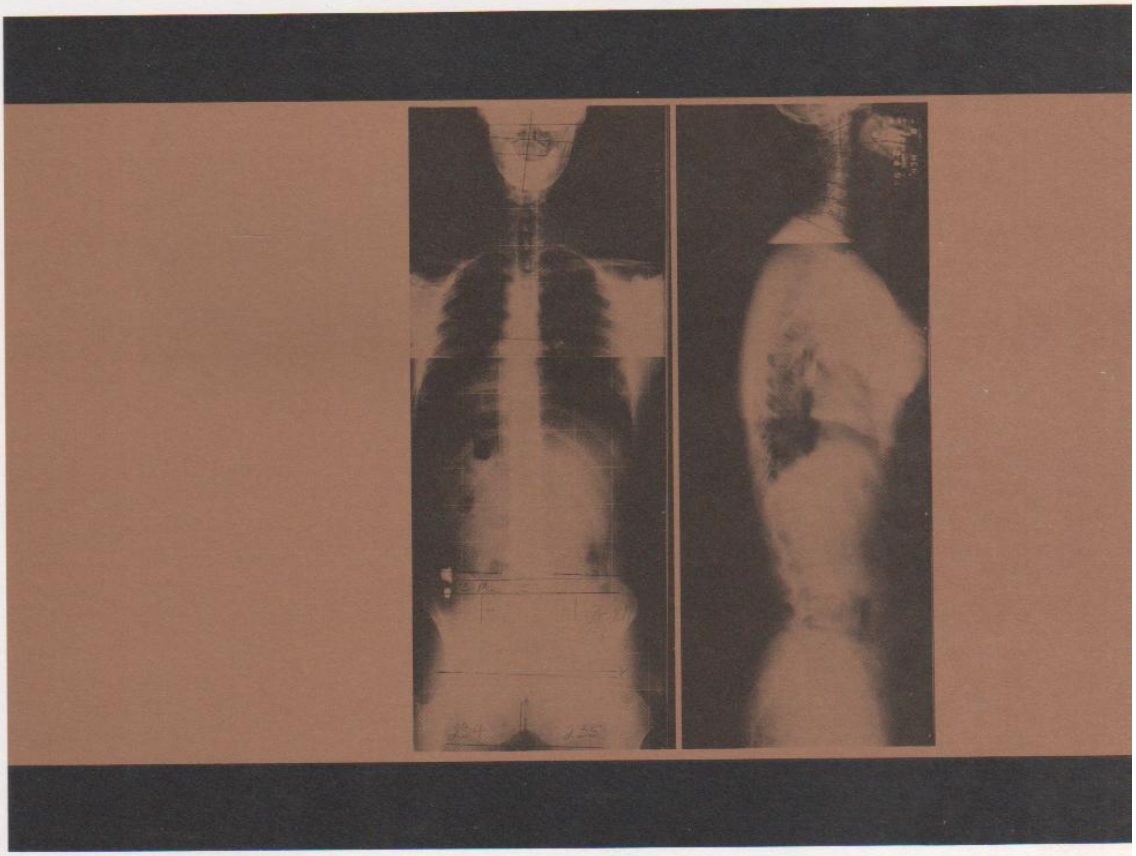


Figure 275: *Same Case as Figures 272-275; "Anterior" Occiput Corrected.*



Full Spine Radiography

Chapter 10



Gonstead Chiropractic Science & Healing Art

Chapter 10

Full Spine Radiography

The Necessity of Full Spine Films

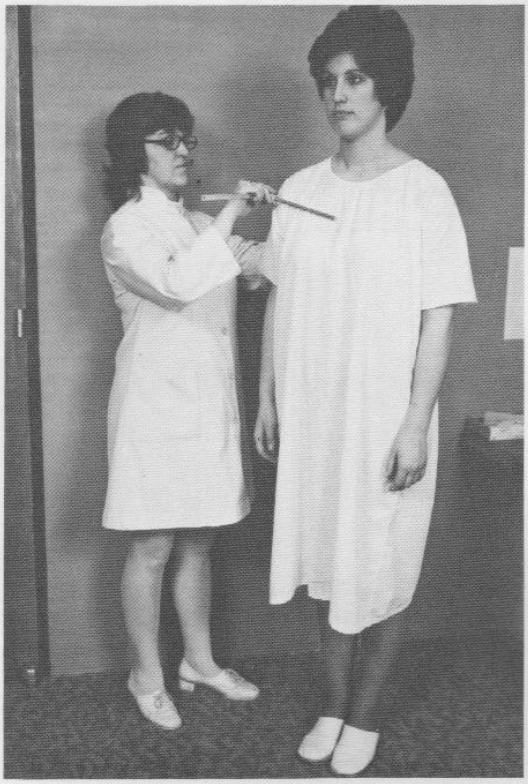
Some doctors have suggested that full spine radiographs are inaccurate and of little value because of excessive distortion. While it may be true that there is more distortion on a 14" by 36" full spine film, as compared to a smaller film, we must keep in mind that we are using the radiograph to determine direction of misalignment, and not to find out where subluxations exist. If we were using the film to determine the location of subluxations (an analytical method which we have deemed unreliable), then distortion could be an important factor. This is so because distortion can alter the *degree* in which a vertebra appears misaligned. However, distortion will not alter the *direction* in which a vertebra is misaligned. In other words, no amount of distortion will cause a vertebra that has misaligned PL to appear PR. The reason for this is that the listing is always ascertained by comparing the position of one anatomical structure with an adjacent structure, and the two adjacent parts are affected by the distortion nearly equally. For example, if a patient has a base posterior of the sacrum, which is determined by posterior misalignment of the sacral base to the fifth lumbar body, there is no way that distortion could make the fifth lumbar appear posterior to the sacrum, since both the sacral base and the fifth lumbar are subject to the same degree of distortion.

Another argument sometimes expressed against the use of full spine films is that a patient may be receiving unnecessary radiation by being x-rayed in an area where he doesn't have symptoms. For instance, if a patient complains of headaches, some might think that only the cervical spine should be x-rayed. This, of course, would be a mistake, since problems in other areas of the spine could also produce headaches.

While some doctors may concede the point regarding headaches, they still might suggest that x-raying the pelvis and thoracolumbar spine is unnecessary for a patient with, for example, a cervical syndrome. While we don't suggest that adjusting the pelvis or lumbar spine will correct a sixth cervical subluxation, we do say that an existing problem below the sixth cervical could, and very often does, prevent the sixth cervical subluxation from remaining corrected after it is adjusted. On the other hand, often, when a pelvic or low back problem is corrected, areas of the spine above can not adapt to changes made below, and additional symptoms may develop from new subluxations. This is particularly true in chronic conditions.

There is still one more important reason for taking 14" by 36" full spine radiographs. For accurate

Figure 276: *Measuring the Chest and Abdomen to Compute the "Centimeters Thickness." The Patient Should Be Standing.*



analysis of the A-P film, it is necessary to have continuity of the image from the ischia to the occiput. There can be no interruption, or parts of the spine missing, which is often the case when two 14" by 17" films are substituted for one 14" by 36" radiograph.

For the foregoing reasons, if the doctor is interested in rendering a complete chiropractic service to his patients, it is necessary to x-ray the entire spine and pelvis regardless of what the symptoms are, or from what areas of the spine he believes they originate.

With this concept in mind, the chiropractor regards the patient totally in his analysis and corrective procedures, and he understands the spine to be a dynamic architectural structure, with no part of it mechanically or functionally independent of the rest.

The purpose of this chapter is to explain the procedures that are used for not only obtaining full spine radiographs of excellent bone detail, but which will also provide the maximum amount of information needed for a detailed and complete chiropractic analysis.

Preparing the Patient

Women patients should be dressed in a gown, and they should be instructed, as should the men, to remove all jewelry and other radiopaque objects that would be visible on the film. Men may be x-rayed in their trousers providing the belt is removed and the pockets are emptied.

Patients should wear their shoes while being radiographed providing they are not completely new, that is, not yet "broken in". If they have been wearing a heel lift, or a shoe that is built up in any way, then the shoes should definitely be worn. If they are wearing high heeled shoes that they do not wear every day, they should be x-rayed with their shoes off.

A tissue or paper towel should be provided for patients who wear dentures, as they must be removed for the A-P view.

The patient should be weighed and measured. Both factors, their weight in pounds, and the thickness of

their body in centimeters, are used to determine the exposure technique best suited to their physical characteristics, and also to select the proper cassette. The patient is measured with a centimeter caliper through the A-P dimension of their chest, and likewise through the A-P dimension of their abdomen (Fig. 276). They should be standing when the measurements are taken. The chest measurement and the abdominal measurement are then averaged, and the result is the figure used as the patient's "centimeter thickness". The patient's weight determines what kilovoltage (KVP) is to be used, and their "centimeter thickness" is used to select the milliampere seconds (MaS).

Gonstead Cassettes and "Split" Screens

Choosing the A-P Cassette

The cassette best suited to the patient is selected according to their total weight. However, their weight distribution, that is, the proportion of thickness through the abdomen as compared to their chest thickness, is an additional consideration.

There are three A-P cassettes to choose from. Each differs in the types of intensifying screens they contain, and in how the screens are distributed. The thicker parts of the body require screens which glow with more brilliance than do the thinner parts, in order to produce an image of uniform exposure throughout a single 14" by 36" film. There are three different "speeds" of screens used, each having a different degree of luminosity.

The "A" cassette uses a "par speed" screen throughout its 36" length. This produces a uniform image with patients who have relatively the same A-P thickness or density through their head and neck, their chest, and their abdomen. The par speed screen produces a medium degree of luminosity. The "A" screen should be used on adults or children patients who weigh under 100 pounds.

The "B" cassette should be used on the average patient who weighs between 100 and 225 pounds. This cassette has par speed screen in the cervical area, "high speed" screen in the thoracic area, and "super-high speed" screen in the abdominal area. The high speed screen has twice the luminosity as does the par speed screen, and the super-high speed has nearly two times the luminosity of the high speed screen.

The "C" cassette is used for heavier patients, particularly those who are heavy through the abdomen and pelvis, and relatively thin through the chest. This cassette has high speed screen in the abdominal area, and par speed screen for the chest and neck.

The Lateral "F" Cassette

A more critical situation arises when the lateral film is being taken, in that there is an even greater variation in tissue thickness and density through the shoulders and innominates, as compared with the neck. In addition, the chest density is greater than the neck, but not so great as the shoulders or pelvis. This variation is overcome by using the "F" cassette for the lateral film. This cassette has "detail speed" screen in the cervical area, super-high speed screen through the shoulders, high speed screen throughout the chest area, and super-high speed screen for the pelvis. Detail speed screen has one fourth the luminosity of par speed. The "F" cassette is invaluable when taking a lateral film because it produces a very uniform image of the spine, in spite of the great variations of tissue thickness and density.

Taking the A-P Film

After the patient has been weighed and measured, and the proper cassette selected according to their weight and body dimensions, the x-ray machine should be set up with the proper exposure values. The technique chart used at the Gonstead Clinic is reproduced in figure 277, and may be used as a guide. Depending upon the output characteristics of the individual doctor's x-ray machine, two, four, or possibly even more kilovolts may have to be added to or substracted from each weight category in order to produce consistently high quality films. The chart shows weight categories between 90 and 330 pounds, and centimeters thickness between 16 and 38 centimeters.

The kilovoltage should be set according to the patient's weight, and the average thickness should determine the amount of time used. The 100 milliampere position should be selected over the 200 milliampere position whenever possible, as this allows

Figure 277: *A-P Technique Chart for Persons Weighing between 90 and 330 Pounds. The Weight Determines the KVP, and the Thickness Determines the Exposure Time.*

LBS.	KVP	CENTIMETER THICKNESS	TIME IN SECONDS	
			100 Ma.	200 Ma.
90–99	70			
100–109	72	16	1.3	.6
110–119	72	17	1.4	.7
120–129	74	18	1.5	.7
130–139	76	19	1.6	.8
140–149	78	20	1.7	.8
150–159	80	21	1.8	.9
160–169	82	22	1.9	.9
170–179	84	23	2.0	1.0
180–189	86	24	2.1	1.0
190–199	88	25	2.2	1.1
200–209	90	26	2.3	1.1
210–219	94	27	2.4	1.2
220–229	98	28	2.5	1.2
230–239	100	29	2.6	1.3
240–249	104	30	2.7	1.3
250–259	106	31	2.8	1.4
260–269	106	32	2.9	1.4
270–279	108	33	3.0	1.5
280–289	108	34	3.1	1.5
290–299	110	35	3.2	1.6
300–309	112	36	3.3	1.6
310–319	114	37	3.4	1.7
320–330	116	38	3.5	1.8

Figure 278: *A-P Technique Chart for Babies and Children Weighing between 8 and 89 Pounds.*

LBS.	KVP	SECONDS	Ma.	FFD
8–10	46	.5	100	60"
11–14	50	.5	100	60"
15–24	62	.5	100	60"
25–34	66	.5	100	60"
35–44	78	.5	100	72"
45–54	82	.5	100	72"
55–64	88	.5	100	72"
65–74	92	.5	100	72"
75–84	96	.5	100	72"
85–89	100	.5	100	72"

the smaller focal spot to be used in most instances. This, of course, will produce a film with greater detail.

But when stabilization of the patient is difficult, such as with muscular dystrophies or atrophies, or when their movements cannot be controlled, as with such conditions as spasmodic torticollis, or hyperkinesis in children, the time should be reduced to a minimum. Thus, by increasing the milliamperage to 200, the exposure time may be reduced by one-half. The time may also be reduced by one-half by adding 12 kilovolts to the KVP.

The chart shows exposure times that are graduated in tenths of a second for both 100 and 200 milliamperes. If your timer is not graduated in increments of tenths of a second, use the time closest to that shown in the chart. The kilovoltage may have to be adjusted accordingly.

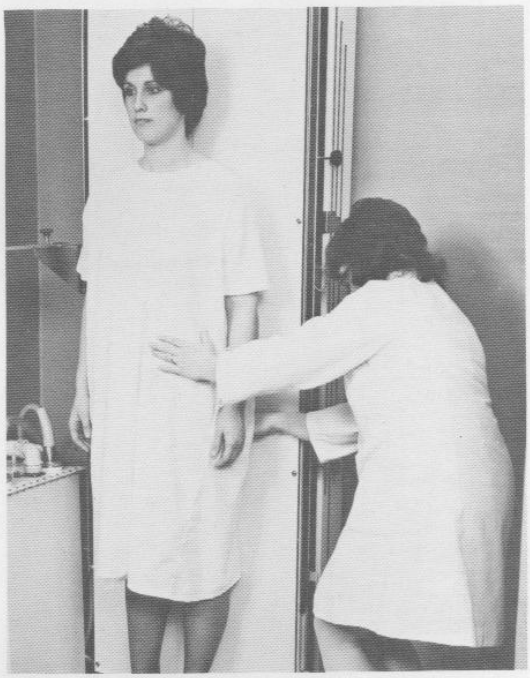
Figure 278 illustrates the exposure technique to be used for babies and children weighing up to 85 pounds. The kilovoltage is varied according to the weight, and in order to reduce movement to a minimum, the timer is set at one-half second for each exposure, while the milliamperage is set at 100. The exposures are taken at a 72" TFD, with the exception of babies and small children up to 35 pounds, who are taken at 60" in the supine position on a horizontal table.

Aligning the Patient for the A-P View

When the patient is aligned in front of the bucky diaphragm, there are two very important factors which must not be overlooked. One is that the patient must not be pressed against the front bucky table, and the other is that the posterior edge of their heels must be parallel to the film. If the patient is leaning too far backwards, or is pressed too hard against the bucky table, the pelvic rotation seen on the film will probably be invalid, possibly in both the direction and amount of rotation. In addition, the posterior edge of the heels must be aligned parallel to the film (i.e., parallel to the bucky table) so that the true pelvic rotation may be shown.

Even though the back of the patient's heels are to be parallel to the film, the feet should remain in their natural position, and should not be made to "flare" equally, nor should inflaring or outflaring of both feet be modified.

Figure 279: *The Doctor Guides the Patient Backwards until the First Part of Them Comes in Contact with the Bucky Table.*



The most effective way of aligning the patient so that their pelvic rotation is represented accurately, is to first center them in front of the bucky without their being close enough to the bucky table to be in contact with it. Then have them take very small steps backwards, until the first part of their body touches the bucky table; that is, so they just barely come in contact with the table without leaning against it (Fig. 279). At the same time, their heels must be on a line parallel to the film, and approximately four inches apart. In this position, the patient should be able to stand comfortably and naturally, yet be stabilized slightly by the bucky table. Usually, either the right or left gluteus maximus muscle, or sometimes both, will be in contact with the bucky table, while at other times the muscles of the thoracic spine will first come in contact with it, depending on the patient's stance, alignment, posture, and so forth.

Sometimes, as when the patient is in an antalgic position, good positioning will be impossible, and the area the doctor believes to be most responsible for the condition should be centered on the film. A second film can be taken later when the patient can stand more normally.

Figure 280: *In Aligning the Cassette Vertically, the Excess Film Should Be Evenly Distributed above the Condyles and below the Ischia.*

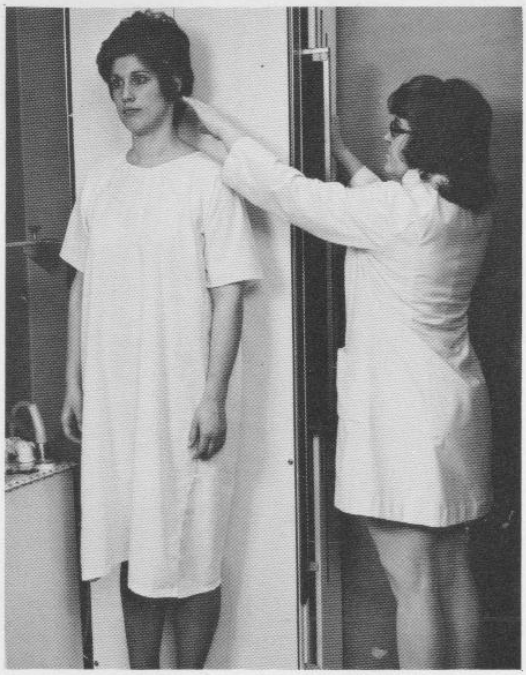
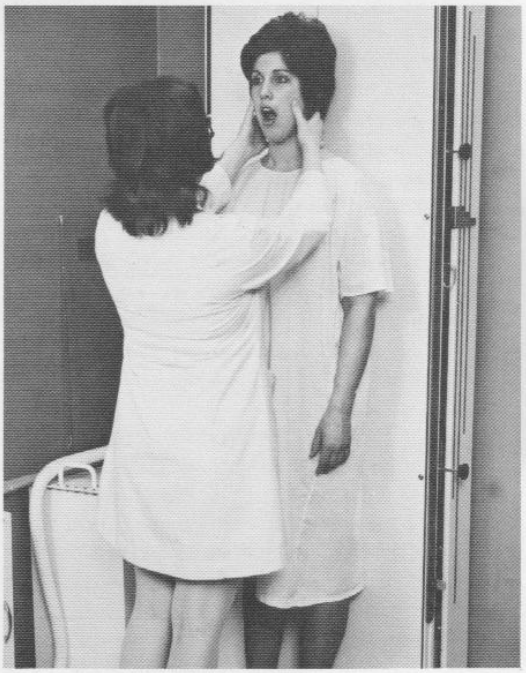


Figure 281: *The Head Position Is Corrected so the Atlas is not Blocked by the Occiput or Upper Teeth.*



With the patient standing in the correct position, it will now be necessary to align the bucky to the patient vertically. First, we must be sure that the inferior borders of both ischia be included on the film. Determine where the ischia are located on the patient, and then move the bucky up or down so the film covers about an inch below the inferior border of the ischia. This will usually be at about the level of the gluteal fold. Then check to see whether or not the patient is too tall to have his mastoid processes (at about the level where the transverse condyle line will be drawn) included on the film. If the patient is tall, and the film coverage will not include his atlas or condyles, leave the cassette where it is for the A-P film. A "spot" film may be taken to include any of the upper cervical area that is missed.

If the patient is short enough that there is considerable area of film above where the condyle line will be drawn, lower the cassette so this distance is distributed evenly at the top and bottom of the film. In other words, there should be just as much excess film below the ischia as there is above the condyles (Fig. 280).

Aligning the Tube

With the patient and bucky properly positioned, it is now necessary to align the tube to the film. The tube distance (FFD) should be set at 72 inches. At this distance there is a minimum of distortion and magnification. If an x-ray unit does not have sufficient output capabilities for this distance, then a lesser distance may be used, provided the tube distance is not less than 60 inches.

The tube should then be aligned vertically so that the central ray falls *two inches below* the center of the film. Offsetting the central ray this distance from the center of the film allows more penetration through the pelvis, and less through the cervical area, resulting in a better balanced exposure. A tube distance of from 60 to 72 inches also provides excellent projection of the thoracic spine due to the angulation of the x-ray emissions through that area.

When children or babies are being x-rayed according to the factors given in the technique chart in figure 278, they should be centered on the film, and the

central ray should fall *one inch below* the center of the film, or at the approximate level of the xyphoid process.

Head Positioning

Before the exposure is taken, the patient's head must be positioned properly to assure visualization of the atlas. The position of the head should be changed only by flexing or extending the neck. Rotational changes should never be made, as these may alter compensatory characteristics of the atlas and other vertebrae that should be visualized on the film in their misaligned positions. Since the A-P exposure is taken with the mouth open, the lower teeth will not obstruct the view of the atlas. But if the neck is too far in flexion, the atlas could be obscured by the upper teeth. On the other hand, if the neck is too far in extension, the squama of the occiput will drop inferiorward and overlap the atlas. Therefore, the neck must be flexed or extended optimally so that the atlas is midway between the upper teeth and the most inferior portion of the occiput.

Aligning the head is relatively easy with edentulous patients. However, in patients with upper teeth, finding the optimal position may take some practice. Some patients, when asked to open their mouth wide, will extend the neck at the same time, so that the occiput drops inferiorward. To prevent this from happening, the doctor should stand in front of the patient, and place his hands so his fingers are supporting the occiput and posterior arch of the atlas. Then the patient should be instructed to open his mouth. If the occiput can be felt to drop down over the atlas, the doctor can correct this by slightly flexing the patient's neck (Fig. 281).

Once the proper head position is found, the patient should be told to keep his head in this position, and to hold the mouth open by lowering the jaw. At the same time, the hands and arms should be relaxed at the sides, the knees should be "locked", and the patient should be breathing naturally. The A-P exposure may now be taken (Fig. 282).

Aligning the Patient for the Lateral Film

The lateral 14" by 36" radiograph is actually a composite of two 14" by 18" exposures on a single sheet of film. The first exposure is taken of the cervical and thoracic spine down to about the ninth

Figure 282: *The Patient Is Positioned for the A-P Film.*

or tenth thoracic vertebra, followed by an exposure made of the pelvis, lumbar, and lower thoracic areas. The patient should be advised of this and asked not to step away from the bucky after the upper exposure is completed. The reason for taking two exposures instead of one is to allow better visualization of the disc spaces, since the angulation of the central ray will be more in line with the discs when only half of the spine is radiographed at one time.

The Upper Cervicothoracic Exposure

Immediately after the A-P view is taken, the x-ray machine should be set up for the first lateral film. Figure 283 illustrates the lateral cervicothoracic exposure technique for persons ranging in weight from 90 to over 200 pounds. The factors are determined by weight alone, and no thickness measurements are taken. Included in the chart are the time factors for both 100 and 200 milliamperes.

For children and babies ranging in weight from eight to 89 pounds, use the same technique for the lateral film as was used for the A-P film, only add two kilovolts to the KVP for each weight category (Fig. 278). The lateral film of babies and children is taken

Figure 283: *The Lateral Technique Chart for the Upper and Lower Exposures.*

UPPER CERVICOTHORACIC EXPOSURE

WEIGHT	KVP	TIME IN SECONDS 100 Ma.	200 Ma.
90–99	88	1.0	.5
100–129	90	1.0	.5
130–159	90	1.5	.7
160–179	92	2.0	1.0
180–199	92	2.5	1.2
200 PLUS	94	3.0	1.5

LOWER THORACOLUMBAR EXPOSURE

KVP	TIME IN SECONDS
The A-P KVP plus 10	Double the A-P time

with one exposure instead of two, because of their small size.

The doctor should examine the patient's spine to determine whether or not there is a scoliosis before placing the patient for the lateral film. If a scoliosis is found, the patient should stand so that the convex side of the lateral curve is closest to the bucky. This allows the least amount of distortion and good visualization of the disc spaces. If the patient does not have a scoliosis, they may stand with either side against the bucky table.

The patient should be placed so that their lumbar spine is in line with the center of the bucky, and the backs of their heels should be on a line that is at right angles to the film. The shoulder that is closest to the bucky should be in contact with the bucky table to aid in stabilization of the patient. Both arms should be elevated and supported on a horizontal bar that is approximately at the level of the xyphoid process (Fig. 284).

The patient's body should not be rotated, and a line through the shoulders should be perpendicular to the film. The patient's head should be in a natural position, similar to how it would be placed if they were looking toward the horizon (Fig. 284).

After the patient has been positioned, it will be necessary to align the cassette vertically. The front of the lateral cassette, that is, the "F" cassette, should be marked with a horizontal line eight inches from the top of the bakelite surface. This line marks the "split", or division, between the upper detail speed screen and the lower super-high speed screen. The cassette must be lowered or raised so that this line is approximately at the level of the inferior portion of the body of the seventh cervical vertebra. This will be the point which, when observed from the lateral aspect of the average patient, separates the dense shoulder area from the cervical spine.

Once the cassette is placed in this position, the tube must be aligned to expose the upper half of the film. The tube distance (FFD) should be set at 60 inches, and then the collimator or coning system should be adjusted to accommodate a 14" by 18" area. The tube should be moved into place vertically so that the central ray passes through a line nine inches from the top of the bakelite surface of the cassette. This line, which will be one inch below the "split" line, should be marked on the outside of the cassette to facilitate alignment of the tube. The first exposure may now be made.

Figure 284: *The Arms Are Supported at the Level of the Xyphoid, and the Head Is Positioned as though the Patient Is Looking at the Horizon.*

The Lower Thoracolumbar Exposure

After the first exposure is made, the patient should be reminded not to step away from the bucky. The doctor should then set up the machine with the exposure factors for the second half of the composite film. Figure 283 explains how the technique for the thoracolumbar portion of the film is computed. Ten kilovolts are added to the KVP that was used for the patient's A-P film, and the MaS used for that film is doubled. For example, if the A-P film was taken at 90 KVP, with 2.4 seconds at 100 milliamperes, the thoracolumbar portion of the lateral film is taken at 100 KVP, and at 2.4 seconds at 200 milliamperes.

As was noted earlier, when babies and children weighing between eight and 89 pounds are x-rayed in the lateral view, two kilovolts are added to the KVP that was used for the A-P film, but the time remains the same (.5 seconds), as does the milliamperage (100 Ma.). The "split" line is still placed at the level of the seventh cervical body, but the central ray is aimed at about the second thoracic vertebra. The film is taken with a single exposure, using 14" by 36" coning or collimation.

The tube and cassette must now be realigned so that the lower exposure can be taken. *The cassette must first be raised four inches.* This is done to insure that the entire spine is projected on the film. If the tube is not moved up four inches, overlapping of the images will cause part of the spine to be missing from the radiograph, since the exposures are taken from two different levels.

After the cassette has been raised, the tube may then be lowered fourteen inches, so that the central ray is in line with the center of the bottom half of the film. The center of the lower 14" by 18" exposure should be nine inches from the bottom of the bakelite surface. This line should be marked on the front of the cassette to facilitate alignment of the tube. With the tube in this position, the second exposure may be taken.

A-P Radiographs of the Knees

Since radiographing the articulations of the extremities is quite basic, and the positioning procedures are presented in many other texts, they will not be given here. However, because the extremities are x-rayed at a tube distance of 60 inches at the Gonstead Clinic, the exposure values used there are duplicated in the technique chart in figure 285.

The knees are an exception since they are radiographed in the standing position and at a tube distance of 72 inches. To have valid, weight bearing x-rays of the knees, the following procedures should be followed.

The patient stands in the A-P position, with the feet about four inches apart, and the posterior edge of the heels on a line parallel to the film. The feet, however, must be *perpendicular* to the film, and they must be placed *parallel* to each other. A 14" by 17" par screen cassette is used for the exposure. The cassette is centered so that the knee articulations are midway between the superior and inferior borders of the 14" by 17" film. The exposure technique is 74 kilovolts, 100 milliamperes at one-half second, and the FFD is 72 inches.

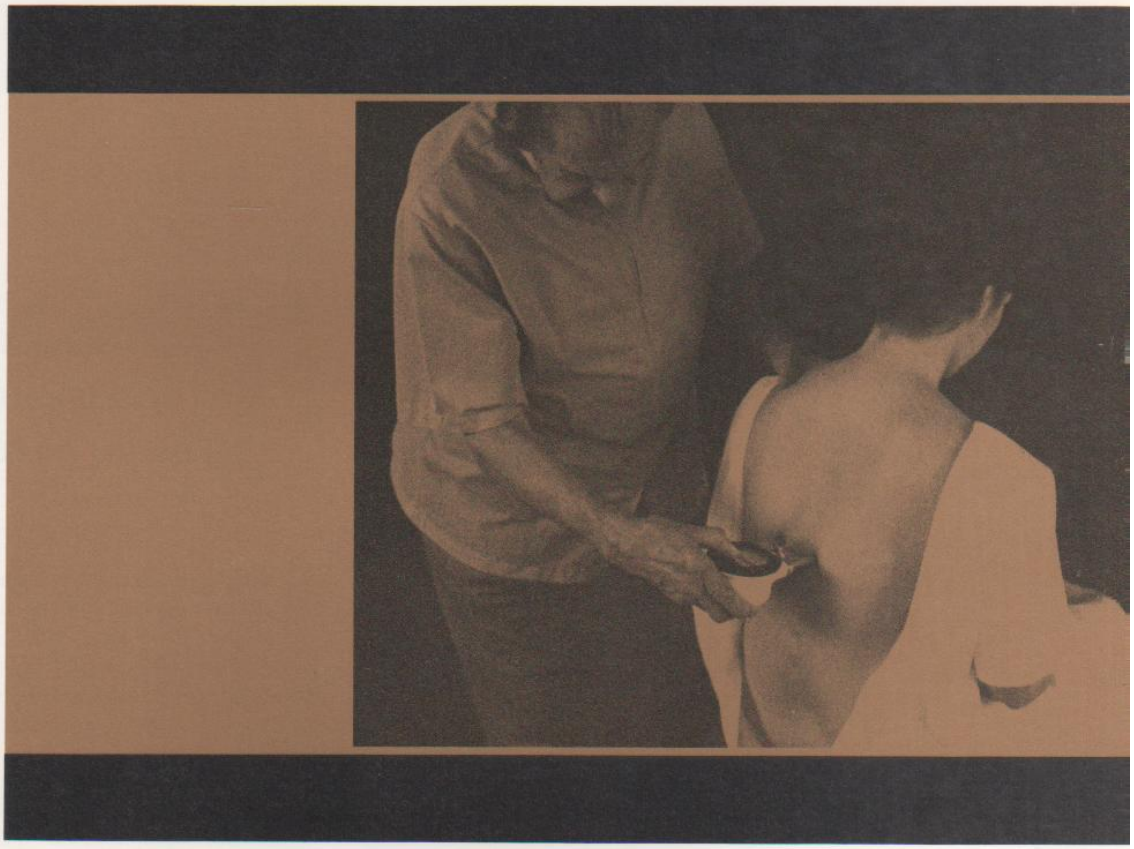
Figure 285: *The Gonstead Clinic Technique Chart Used for Extremity Articulations.*

ARTICULATION	KVP	SECONDS	Ma.	FFD
Knees (A-P, standing)*	74	.5	100	72"
Shoulder (A-P, standing)*	68	.5	100	72"
Knees (A-P, recumbent)	54	.2	100	60"
(Lateral, recumbent)	56	.2	100	60"
Tibia – Fibula (A-P)	48	.2	100	60"
Ankle – Foot (A-P)	52	.2	100	60"
(Lateral)	54	.2	100	60"
Metatarsals (A-P)	44	.2	50	60"
Elbow (A-P)	52	.2	100	60"
(Lateral)	54	.2	100	60"
Wrist (A-P)	40	.2	100	60"
(Lateral)	42	.2	100	60"
Metacarpals – Thumb (A-P)	46	.1	50	60"
Ankle Spur (Lateral)	42	.3	100	60"

*Note: Exposures are made with par speed screens. All are taken without the bucky, except knees while standing and shoulder while standing.

Instrumentation

Chapter 11



Gonstead Chiropractic Science & Healing Art

Chapter 11

Instrumentation

The Purpose of Chiropractic Instrumentation

For any patient seeking chiropractic care, the most important question in mind is whether or not the doctor can help him. The chiropractor's answer to this question, and usually the underlying basis for his decision to accept or refuse a case, should rest upon one fundamental consideration: Does the patient have a subluxation? Fortunately, there is a way for the chiropractor to know with a high degree of certainty whether or not subluxations exist.

Every subluxation produces objective evidence of its existence. This evidence is manifested in a number of different ways. The most reliable sign is in the form of abnormal temperatures in the paravertebral tissues.

In the Gonstead work temperature recording instruments are employed which verify the existence of vertebral subluxations, and indicate their exact location. When the precise location is known, the chiropractor can identify the vertebra that is responsible, and make the necessary corrections.

Most subluxations require a number of adjustments before the correction is completed. During the process of adjusting the vertebra, the instrument readings will show how the correction is progressing. Finally, when the vertebra is correctly and completely repositioned, the instrument readings will cease to exist, and indicate that no further adjustments are necessary.

In addition to the functions mentioned above, the temperature recording instruments will give both a quantitative and qualitative description of the subluxation. That is, the readings will indicate whether the subluxation is mild or severe in its intensity, and will also show if it is acute or chronic in nature.

It can be seen, therefore, that the use of chiropractic instrumentation will serve many important functions. The readings will show whether or not subluxations exist, where they exist, if they are being corrected, and when the correction is complete. They will also point out whether the subluxation is acute or chronic, and mild or severe.

This chapter will establish the rationale for using temperature recording instruments, and will instruct the reader in the instrumentation technique that is employed at the Gonstead Clinic.

Body Surface Temperature

Heat is produced within the body as a by-product of cellular metabolism. As heat is released from the cells, it is transmitted to the surface of the body and radiated or conducted to the surroundings. When heat production becomes excessive, as when exercising, for example, greater amounts of heat must be dissipated in order to keep the body temperature within normal range. Under these conditions, vasoconstriction is decreased through the action of the sympathetic nervous system, and more blood is delivered to the subcutaneous venous plexus. This allows increased heat flow from the body surface.

Because of the way metabolic heat diffuses to the body surface, and due to the fact that the venous plexus is profusely distributed throughout the subcutaneous tissues, the temperature of the skin should differ very little from one surface area to another. Those differences that do occur will normally be gradual and moderate in degree. In addition, when dissimilar surface temperatures do exist, they should be found bilaterally. That is, temperature variations on one side of the body should match those on the contralateral side and correspond with the same anatomical surface area. For example, the temperature of both arms should be the same although their temperature may differ from that of the legs.

An obvious exception to this would be the skin temperatures over some of the larger subcutaneous veins. Since the veins are not distributed equally on both sides of the body, they will normally produce bilateral skin temperature variations. This is quite evident with thermography and infrared photography. However, for our purposes, these variations will be of little consequence, as will be explained later.

Temperature Variations

Differences in temperature found on the body surface are usually caused by local conditions. A relatively small tissue area will be producing more or less heat than adjacent tissues. For example, a muscle that is contracting more than another will have a higher metabolic rate, and will therefore produce more heat.

Different rates of muscle metabolism could be caused by anatomical variations in the skeletal system. An anatomically short leg, for example, might produce different states of muscle contraction in the body, resulting in unilateral temperature changes. Such temperature differences are also caused by muscle imbalances due to physiological misalignments. A sacroiliac misalignment may cause the muscles of one leg, or of one side of the spine, to have to work harder to support the body against gravity. These and similar structural variations in the body, both anatomical and physiological, will be the cause of many unilateral skin temperature changes.

Another cause of unilaterally altered body surface temperature is dilatation or constriction of the subcutaneous blood vessels in response to locally warmed or cooled areas of the skin. This is a local vasomotor cord reflex which helps to control body temperature. There are also local sweating reflexes which, through evaporative cooling, will alter skin temperature unilaterally.

There are numerous other conditions which will cause localized skin temperature changes. These may include injuries such as contusions or burns, vascular disturbances resulting in hyperemia or ischemia, infections, including fungus and bacterial infections, and numerous other types of inflammatory lesions.

Subluxation Alters Body Surface Temperature

In addition to the conditions mentioned above, vertebral subluxations will also produce local changes in the surface temperature of the body. *A subluxation is a spinal lesion which produces an inflammatory reaction at the contact site of a protruded intervertebral disc and a compressed nerve.* The compression and inflammation of the nerve will alter the nerve's function, and interfere with the normal transmission of nerve impulses at the periphery. Furthermore, it is believed that *the compression and inflammation will alter the metabolic rate of the nerve itself.* As was mentioned earlier, a change in the metabolic rate will produce a change in the metabolic heat. Both the inflammation of the nerve and the altered metabolic heat of the nerve will produce temperature changes that are detectable at the skin surface.

In an acute subluxation all the characteristics of

inflammation will be present, including heat, swelling, pain, redness and loss of function. The metabolic rate of the nerve will be increased, producing heat at a higher than normal rate. The heat will be conducted *from* the area of tissue damage (i.e., the point where the nerve is compressed by the disc) to the surrounding tissues (Fig. 286).

When a subluxation becomes chronic, the acute signs of inflammation will subside, and the metabolic rate of the nerve will be decreased. Hence, the metabolic heat of the nerve will be less than normal, and heat will flow from the surrounding tissues *toward* the site of tissue damage (Fig. 287).

Figure 286: *In the acute subluxation heat radiates from the area of tissue damage to the periphery due to the increased metabolic rate of the involved nerve.*

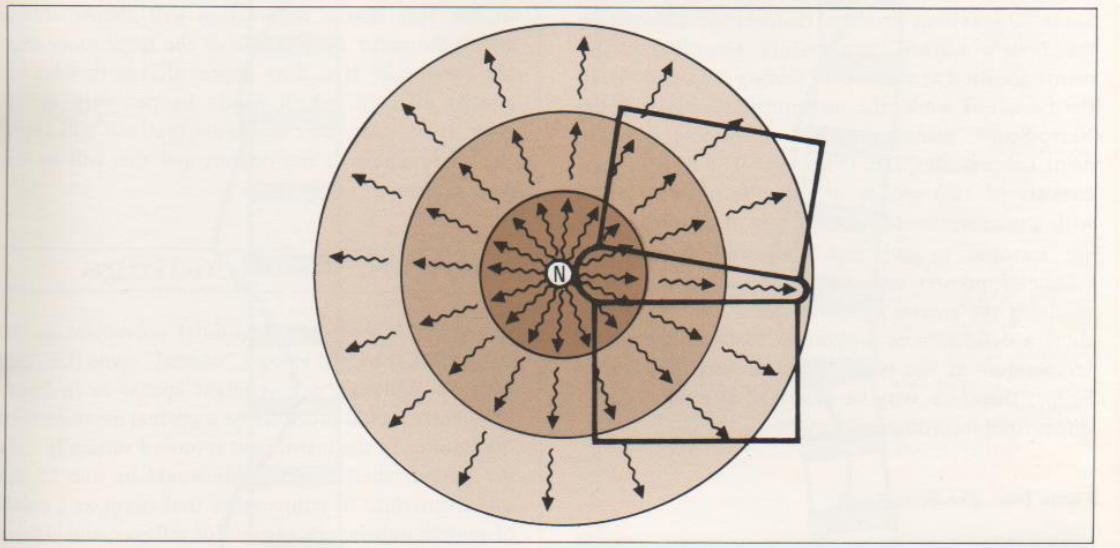
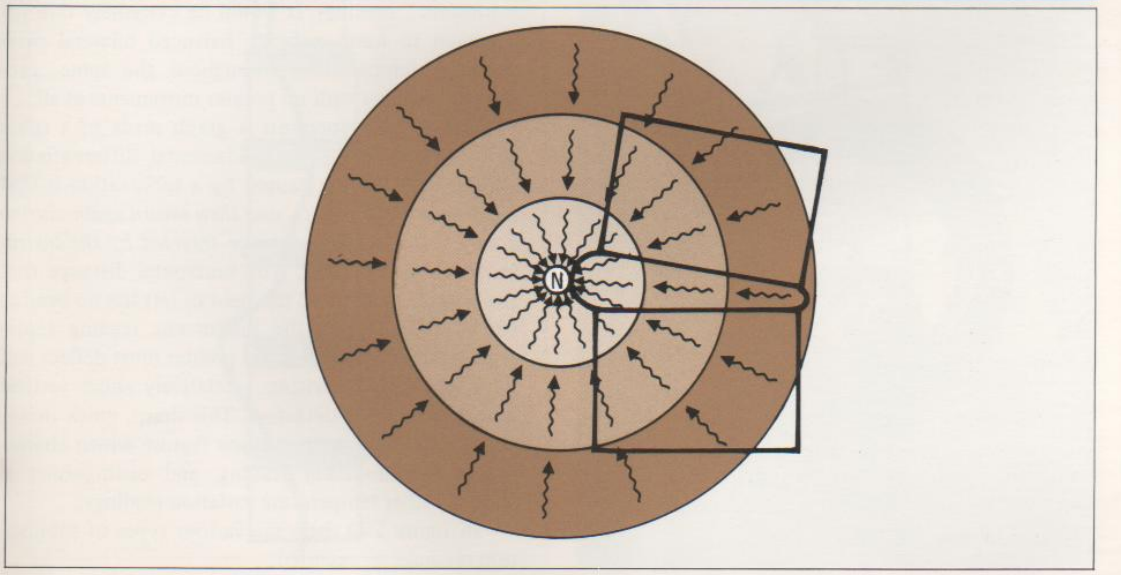


Figure 287: *In the chronic subluxation heat radiates from the surrounding tissues to the area of compression due to the decreased metabolic rate of the involved nerve.*



Finding the Subluxation

The Nervo-Scope

Since subluxations produce temperature changes on the body's surface, temperature recording instruments are used as a means of finding subluxations. In the Gonstead work, the instrument of choice is the Nervo-Scope, manufactured by Electronic Development Laboratories, Inc. (Fig. 288). The Nervo-Scope consists of two groups of thermocouples in series with a microvoltmeter. The groups of thermocouples are arranged in two input detectors so that the voltmeter pointer will deflect toward the detector receiving the greater amount of heat. The meter will show a deflection in proportion to the difference in temperature at the two input detectors. The Nervo-Scope, therefore, may be described as a *temperature differential* recording instrument.

Figure 288: *The Nervo-Scope.*

Since we are concerned with finding subluxations, and subluxations infer altered nerve metabolism, the effects of which are conducted to the surface, we compare the temperatures of the tissues directly over the nerves. The paraneural temperatures of the right side of the spine are compared with those of the left side. In other words, the right nerve is compared with the left nerve.

By comparing the nerves bilaterally, we will know whether or not a subluxation exists. This is due to the fact that *a subluxation will almost always affect the nerve on one side of the spine more than the other side.* If it does appear that both sides are equally affected, which would happen very rarely, there is an instrument technique that will still reveal the subluxation to the doctor, and this will be explained later.

Nervo-Scope Readings

If a graph is made of the pointer movement as the instrument is moved along a "normal" spine (i.e., one with no subluxations), it might appear as in figure 289. There would probably be a gradual movement of the pointer as the instrument is moved vertically over the paravertebral tissues. This would be due to the slight variations in temperature that occur as a result of muscle imbalances, vasomotor reflexes, and similar causes that affect the surface temperatures in a moderate and gradual way. For the sake of simplicity we could call these temperature variations "muscle-vasomotor" readings. It would be extremely rare for a person to have perfectly balanced bilateral paravertebral temperatures throughout the spine, producing a reading with no pointer movements at all.

Figure 290 represents a graph made of a spine with subluxations. The fundamental differentiating feature of a reading caused by a subluxation is that *the pointer will deflect, and then return again, during a very short vertical distance traveled by the instrument along the spine.* The horizontal distance that the pointer deflects to the right or left has no bearing on whether or not the instrument reading represents a subluxation. But the pointer must deflect and then return again within a relatively short vertical movement of the detectors. This sharp, quick movement of the pointer is the one feature which characterizes a subluxation reading, and distinguishes it from all other temperature variation readings.

In figure 290 there are various types of subluxation readings represented.

Figure 289: *A graph of the pointer movement in a spine without subluxations. The temperature variations are slight and gradual.*

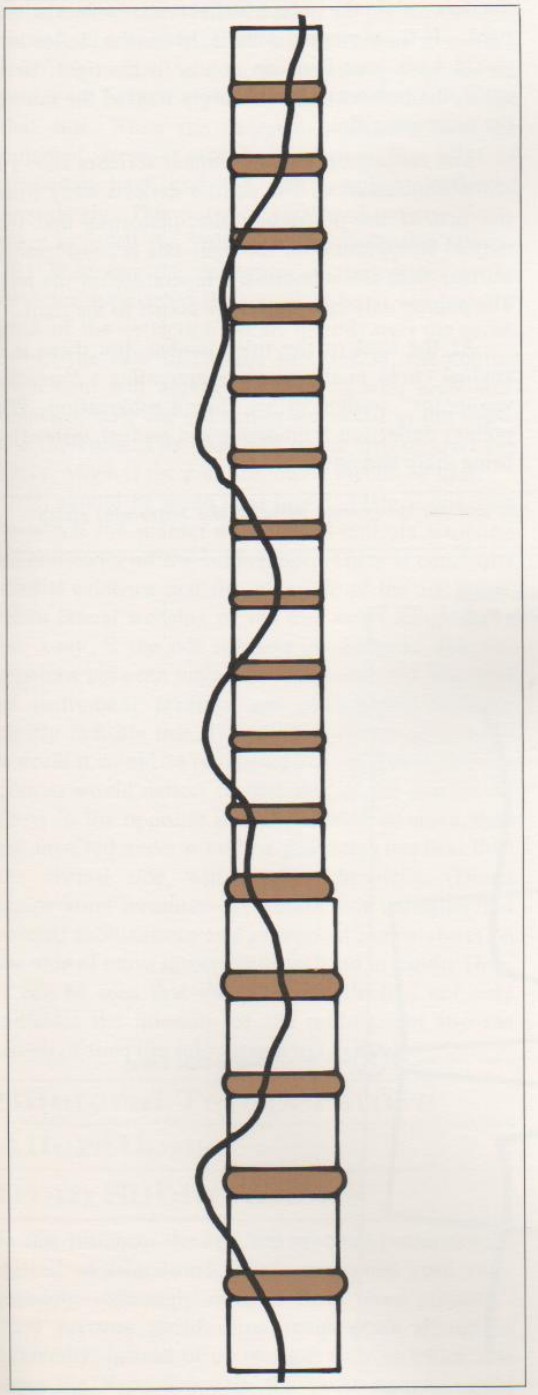
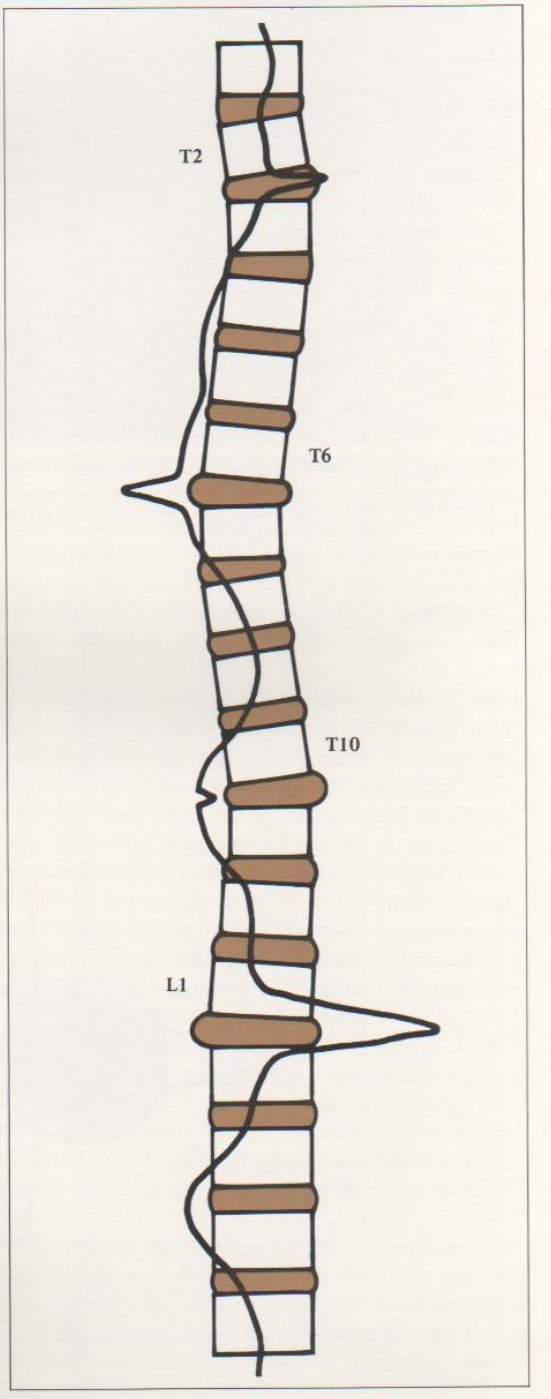


Figure 290: *A graph of the pointer movement in a spine with subluxations. Characteristic subluxation readings are seen at the disc levels of T2, T6, T10 and L1.*



The reading representing the subluxation at the level of the second thoracic vertebra is the most typical. It shows a sharp deflection to the right, and then a return of the pointer, all within a short vertical distance. The pointer swing might traverse about ten "points" on the scale, which reads from zero to twenty-five. The pointer deflects toward the wide side of the wedge, that is, toward the side of the protruding disc (confirmed by the radiograph), indicating that the subluxation is producing more heat than normal. This indicates that the subluxation is acute.

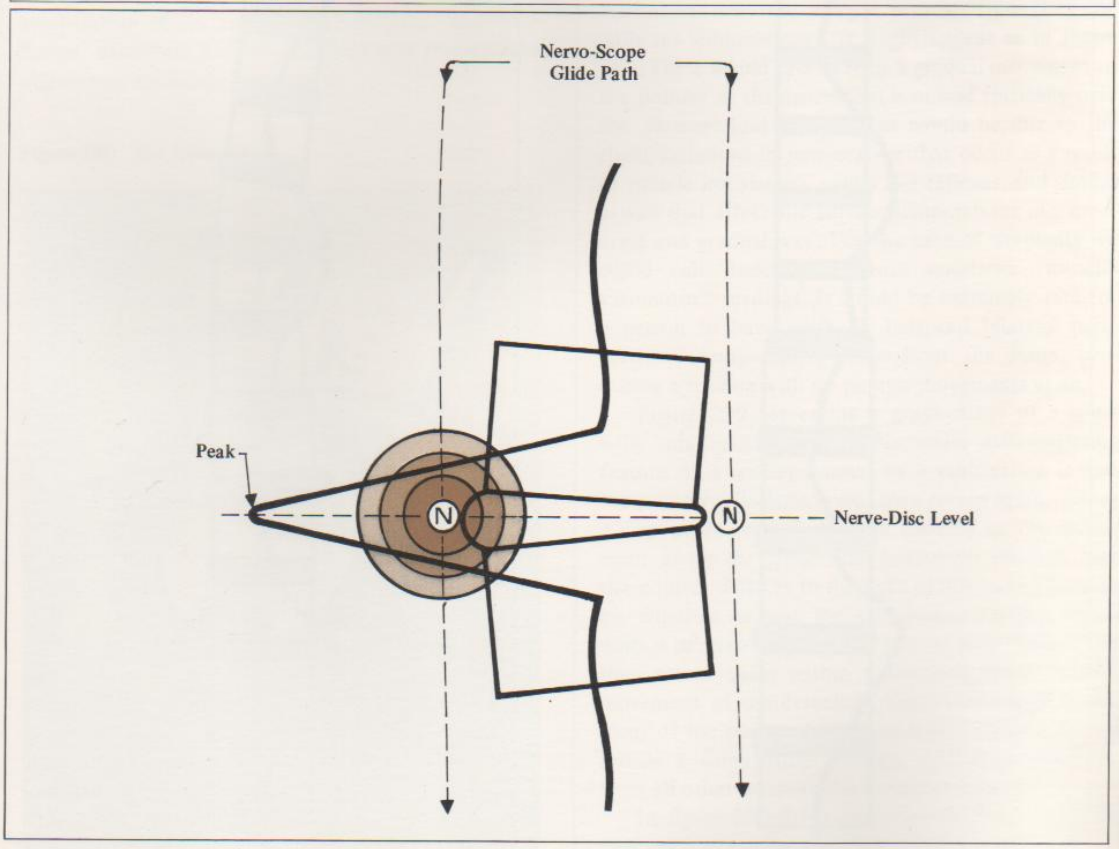
The reading at the sixth thoracic is moderate in degree, but shows a sharp deflection and return of the pointer. However, the sharp deflection occurs while the pointer is in the middle of a broad "muscle-vasomotor" deflection. The pointer was about ten points to the left on the scale before sharply deflecting another ten points. Were it not for the "muscle-vasomotor" heat, the pointer would have deflected about twenty points to the left. The pointer deflects toward the side of the protruding disc, and is therefore acute.

The subluxation at the tenth thoracic vertebra indicates that the muscle heat is about ten points to the left , while the pointer deflects four points to the right . If there was no muscle heat, the deflection would have been fourteen points to the right. Here again, the pointer deflects sharply toward the side of the protruding disc.

The reading at the first lumbar vertebra shows a chronic subluxation. The pointer deflects away from the side of the protruding disc, indicating that the normal temperature on the right side is considerably warmer than the subnormal temperature on the left. The pointer deflects twenty-five points to the right.

At the level of the third lumbar disc there is a gradual curve in the graph, representing a "muscle-vasomotor" reading rather than a subluxation. The pointer deflection is moderate and gradual, instead of being sharp and quick.

Figure 291: *The "peak" occurs at the level of the protruded disc and the compressed nerve, as the instrument glides vertically along the spine.*



The Peak of the Deflection

In the acute subluxation increased metabolic heat radiates from the inflamed nerve to the surrounding tissues. The heat becomes less intense as it radiates from the source. As the one detector approaches the source of heat, the pointer will be deflected toward that side. When the detector is directly over the inflamed nerve it will have reached the point of maximum heat, and the pointer will be deflected accordingly. This point of maximum pointer movement is called the "peak" of the deflection. Figure 291 illustrates the deflection of the pointer as the detector approaches the source of heat, and how the peak of the deflection occurs directly over the nerve.

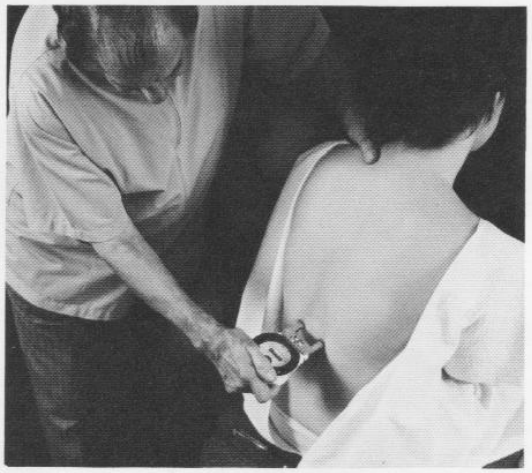
In the case of chronic subluxation, the pointer movement will appear the same as with acute subluxation, only the deflection will occur in the opposite direction. The peak will occur directly over the nerve, which is the point of lowest metabolic heat.

It should be made clear how the lateral direction to which the pointer deflects will indicate acuteness or chronicity of the subluxation. There is conclusive clinical evidence that the wide side of the disc space, when lateral wedging of the disc exists according to the x-ray, is the side of nerve involvement. The correlations between unilateral symptoms, the disc level of instrument readings and radiographic evidence clearly indicate this. Therefore, if the involved nerve is acute it would be producing increased heat, and the pointer would deflect to that side. If the pointer deflects to the opposite side of the involved nerve, then the involved nerve would be producing less heat than the normal side, which infers chronicity. (Direct temperature measurement studies have indicated that chronic subluxations and subnormal temperatures on the side of nerve involvement go hand in hand.) Thus, it can be seen that the pointer deflection not only indicates the intensity of the reading, but also the length of time the subluxation has existed.

Bilateral Temperature Alterations from Subluxations

In rare instances the disc will protrude posteriorward instead of lateralward, producing spinal cord compression, commonly referred to as "cord pressure." Cord pressure could cause temperature alterations bilaterally, instead of on one side only, in which case using the Nervo-Scope in the usual manner would allow them to go undetected. This situation should always be suspected when the symptoms indicate bilateral nerve involvement. When this occurs the instrument should be tilted as it is glided along the spine, so that an upper vertebral segment is being compared with a lower one. Using this method, the pointer will peak at the level of cord pressure (Fig. 292).

Figure 292: *When "cord pressure" is suspected, the instrument must be tilted to compare an upper segment with a lower one.*

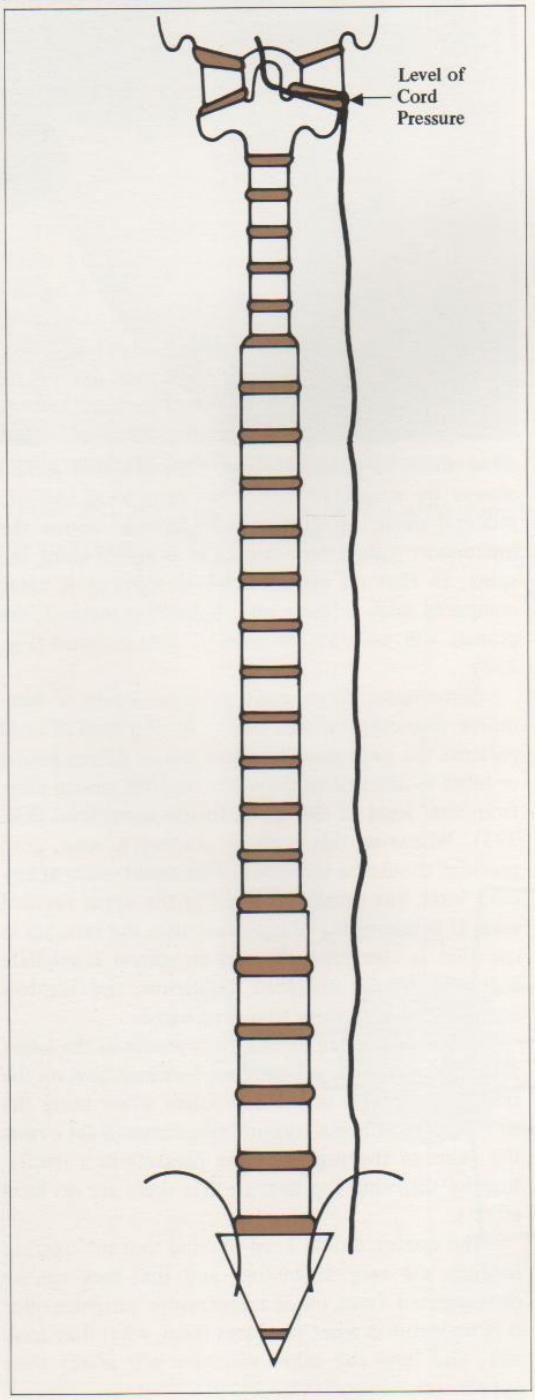


Sometimes, when cord pressure exists, a vasomotor phenomenon will occur. At the level of cord pressure the pointer will deflect ten or fifteen points or more to one side or the other, and will remain there from that level of the spine, to the sacral level (Fig. 293). Whenever this type of reading is seen, cord pressure should be suspected. This could occur at any cord level, but usually is found in the upper cervical area. It is interesting to note that after the vertebra in question is corrected, there is an almost immediate reduction in the sustained deflection, and the loss of unilateral vasomotor tone is restored.

It was mentioned earlier that sometimes the larger subcutaneous veins will produce localized heat on the skin surface. This is not a problem when using the Nervo-Scope, since a layer of subcutaneous fat covers the veins in the region of the paravertebral tissues, thereby diffusing the heat so that there are no local effects.

The doctor should keep in mind that subluxation readings are very distinctive, and that they can be distinguished from other temperature variables once it is understood what produces them, what they look like, and how the other variables will affect their appearance.

Figure 293: *Cord pressure will sometimes produce this type of instrument reading due to a unilateral vasomotor disturbance.*



Using the Nervo-Scope

Before using the Nervo-Scope, the sensitivity switch on the front of the instrument should be set on the letter "H", indicating high sensitivity. (The "S", or standard, position is used only when the pointer movements are excessive and greatly intensified due to extreme "muscle-vasomotor" variations. Lessening the sensitivity of the instrument will sometimes make the subluxation readings more discrete.) The detectors should be set at their widest point, and the wing nut should be tightened. The patient should be seated when using the instrument, except in severe low back conditions where it is advantageous to make the examination with the patient in a weight bearing position. The detectors are first placed at about the level of the seventh cervical vertebra. The "glide", or vertical movement, is begun at this level, and proceeds inferiorward. Before the glide is started, however, be sure the pointer has come to rest completely. This may necessitate holding the detectors on the skin for a few seconds before any vertical movement is begun. Also, always be sure that the detector arms are held at a ninety degree angle to the surface of the body to minimize the chance of air leaks occurring (Fig. 294). It is important that the detector arms not be touched by the hands when holding the instrument, since this may affect the accuracy of the readings.

As the glide proceeds inferiorward, the Nervo-Scope should be tilted to conform to spinal curvatures (Fig. 295). This allows the right and left spinal nerves to be compared with each other, instead of with a nerve above or below.

When a subluxation reading is suspected, the glide should be repeated over the same area a number of times so that the chances of error in misreading or misinterpreting the instrument are minimized. Repeating a glide will make a false reading more detectable, and an actual subluxation reading will become more discernible. This is because the friction from the terminals will nullify the effects of "muscle-vasomotor" readings, and minimize other variables.

If a reading is from an actual subluxation, it cannot be "erased" by repeated glides. In fact, the more glides that are made, the more obvious the reading should become. Continued glides may alter vasomotor heat because of the friction they produce, but the deflection will remain, and peak at the same exact level. When a reading thought to be from a subluxation is obscured or erased by subsequent glides, then the

Figure 294: *The instrument should always be held ninety degrees to the body surface.*

reading was probably "false", being only from vasomotor heat, or some other variable.

An actual subluxation reading will be reduced or eliminated only after the normal metabolism of the nerve is restored, and this is usually possible only by adjusting and correcting the subluxated vertebra.

When the doctor decides that he has found a subluxation, he should mark the patient's skin at the level of the peak with a skin marking pencil. This point should be directly over the inflamed nerve and the protruded disc. The peak should be marked on the side of the spine toward which the pointer deflects, far enough from the center line that repeated glides will not traverse the pencil mark. Otherwise, the detector heads will become clogged with wax from the pencil, and affect the sensitivity of the instrument.

The search for subluxations should be completed by continuing the glide as far inferiorward as below the sacroiliac articulations (Fig. 296).

After the thoracolumbar and sacroiliac areas have been examined, the instrument should be used on the cervical spine. The detector arms should be made to converge, if necessary, in order to properly fit the patient's neck. The glide should begin below the seventh cervical vertebra, and proceed superiorward until the occiput is reached. The Nervo-Scope should be kept level when reaching the occiput, and should not be tilted inferiorward to attempt to take a reading any higher (Fig. 297). The highest reading possible is of the first cervical nerve at the atlanto-occipital articulation. It is unnecessary to bring the instrument onto the squama of the occiput.

Figure 295: *The instrument should be tilted wherever the spine is curved so that the right nerve is always compared with the left.*

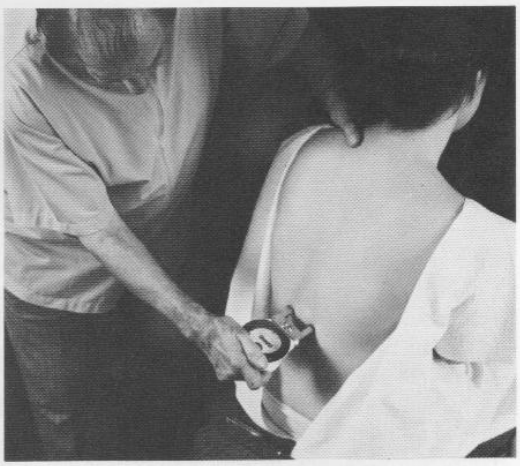


Figure 296: *The instrument glide includes the sacroiliac articulations.*

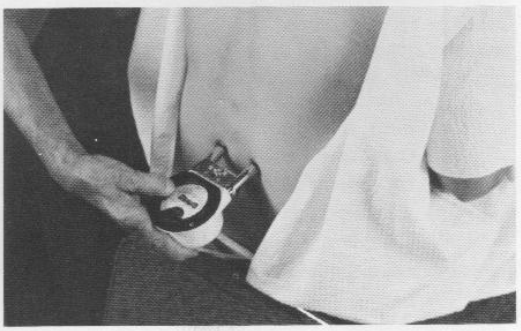
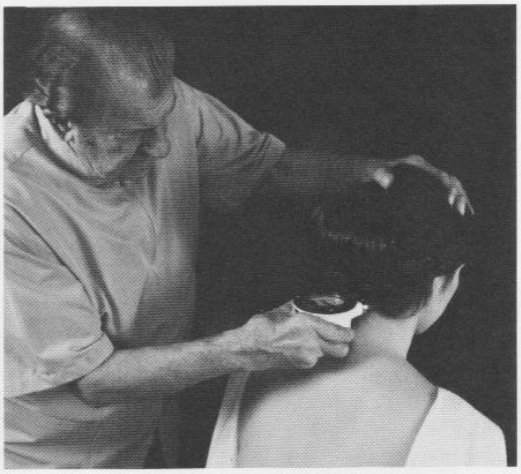


Figure 297: *The glide superiorward ends at the occiput, and includes the first cervical nerve. The Nervo-Scope is kept level, and is not glided up the occiput.*



Errors in Instrument Technique

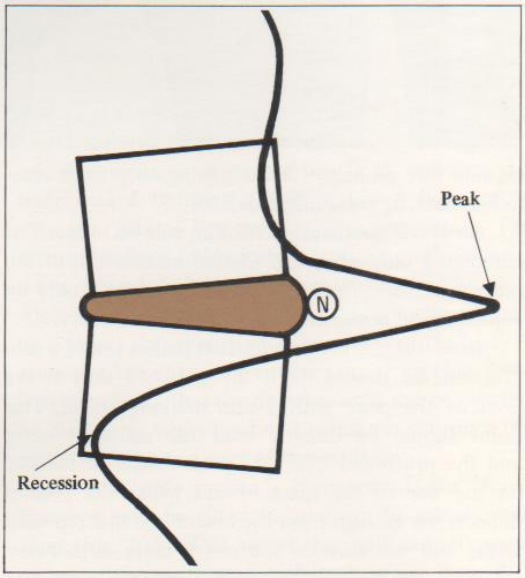
One of the most common causes of error in using the Nervo-Scope is in moving the instrument too fast, not allowing the pointer time to react to the temperature changes. Obviously, this would cause subluxation readings to be missed. The glide should always be made very slowly. In the cervical region, where there is more to observe within a smaller area, the rate of glide should be about three seconds per inch, or even slower. In the thoracic and lumbar areas, about two seconds per inch should be the maximum speed.

In addition to moving the instrument too fast, there are a number of other technique errors that are commonly made, any of which could lead to an incorrect conclusion if the doctor is not careful. These could cause subluxation readings to be missed, could produce false readings, or could cause subluxation readings to be marked at the wrong level.

The following mistakes in technique should be avoided.

1. Using uneven pressure on the instrument, causing excessive friction on one of the detectors.
2. Not using sufficient pressure, thereby allowing air leaks. The skin should be cupped around the detector heads, completely covering the thermocouples.
3. Not having the detectors fit the cervical spine, allowing air leaks.
4. Not repeating the glide often enough to reduce the ambient temperature, and "bring out" the reading.
5. Not keeping the speed of the glide constant.
6. Marking skin lesions and local inflammations as subluxation readings.
7. Not marking the reading at the peak, due to sagging skin, or skin that is excessively elastic (as in babies). In such cases, the instrument may be "dotted" along the spine. That is, it may be placed on and off the skin every few millimeters as the instrument is moved vertically down the spine. The peak can be located very accurately this way.
8. Stopping the instrument after a subluxation reading is found (after the pointer returns), and marking the peak at the level of the detector head. In this case the detector has already passed the peak, it being about ¼ inch below in the cervical area, and about ½ inch above in the thoracolumbar region.
9. Marking the "recession" as the peak. The recession is the motion of the pointer as it returns from the peak. It sometimes goes beyond the original starting point due to "muscle-vasomotor" heat on the opposite side, and is often mistaken for the subluxation reading (Fig. 298).
10. Not keeping the Nervo-Scope centered along the spine as the glide is made, particularly when scoliosis is present. The doctor must learn to watch the glide path and the action of the pointer at the same time.

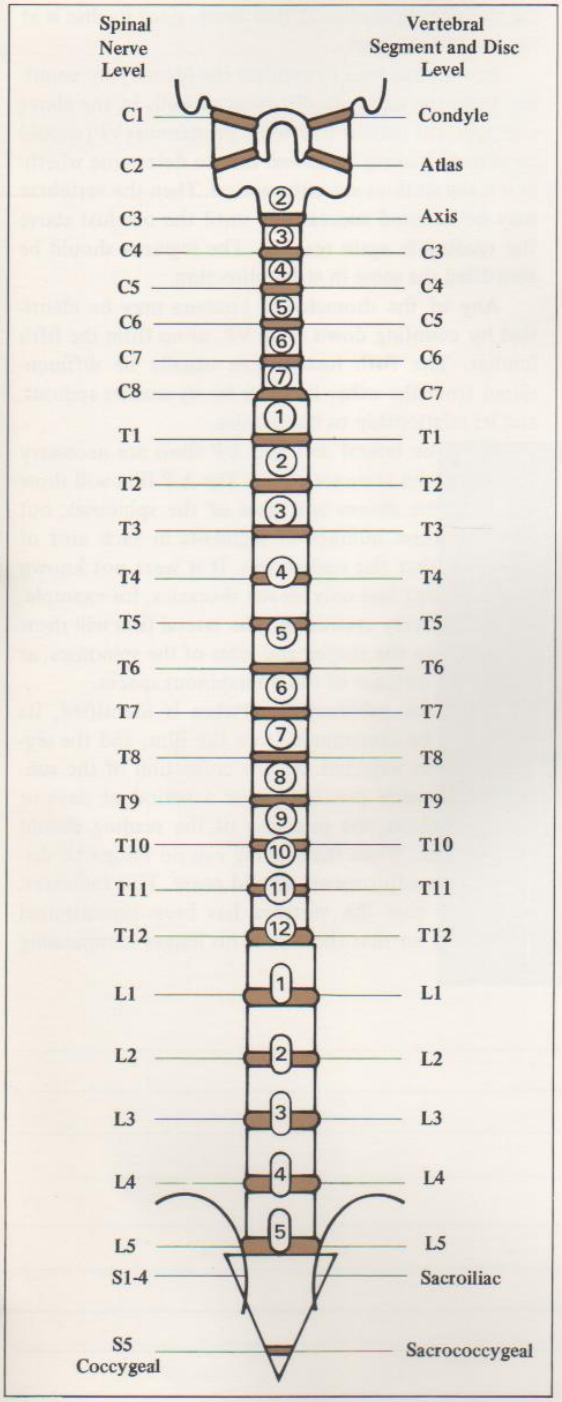
Figure 298: *A "recession" reading is sometimes mistakenly marked instead of the peak.*



Identifying The Vertebra

Having found out where the involved nerve is on the surface of the patient's back, the doctor must then identify which vertebra is responsible for compressing that nerve. Knowing the level of the nerve also tells us the level of the disc. Since we know that the vertebra in question is immediately above the involved disc, we should be able to identify the subluxation by knowing which spinous processes go with which discs. For example, if we know the identity of all the spinous processes, which we determine through palpation, we should be able to know where the nerve pressure would show up if any one of the vertebrae were subluxated. Conversely, if we know where the

Figure 299: *The relationship between the spinous process and the level of the nerve-disc changes according to the area of the spine.*



nerve pressure is (which the instrument tells us), we should be able to determine which spinous process belongs to the vertebra above the involved disc.

Examples

A patient has an instrument reading in the middle of the thoracic spine. We identify, by palpation, the spinous process above the reading as the seventh thoracic, and the spinous process below the reading as the eighth thoracic. Which is the subluxation? We know it would have to be the eighth thoracic since the disc level for an eighth thoracic vertebra is between the seventh and eighth spinous processes.

Another patient has a reading in the lower lumbar spine. We identify the fifth lumbar spinous, and find it below the reading. Then we count superiorward, finding the fourth lumbar spinous in line with the reading, and the third lumbar spinous above the reading. Knowing the structure of the fourth lumbar vertebra, we know that the fourth lumbar must be the subluxation since its disc is on the same level as the lower portion of its spinous process. In addition, the reading is too high to belong to the fifth lumbar, and too low to belong to the third lumbar.

In a third patient, a reading is found slightly inferior to the spinous of the axis vertebra. Our knowledge of anatomy tells us that the disc of the third cervical is below the third spinous process, and that the axis disc is inferior to the axis spinous. We conclude, therefore, that the reading is due to an axis subluxation.

The above method is used to determine which vertebra should be adjusted. Since anatomical variations are common, any patient could vary considerably from what is considered "average," The patient's x-rays should be consulted very carefully when attempting to match spinous processes with disc levels. The following will serve as a general guide, and apply to most people, however.

Atlas – Occiput: Both readings occur very close together, slightly below the occiput. The radiograph must be used to differentiate between the two so that the subluxation can be chosen.

Axis through 3rd Thoracic: The reading should be inferior to the spinous process.

4th Thoracic: The reading should be on the same level as the spinous process.

5th Thoracic through 9th Thoracic: The reading should appear in the interspinous space above the spinous process of the involved vertebra.

10th Thoracic through 12th Thoracic: The reading should be at the level of the spinous process.

1st Lumbar through 5th Lumbar: The reading should appear at the level of the lower one fourth of the spinous process.

Sacroiliac: The reading could appear anywhere between the superior and inferior boundaries of the sacroiliac articulation.

Figure 299 illustrates the relative positions of the spinous processes, and the disc and nerve level of each of the vertebrae. It can be seen how the subluxation can be identified once it is known how the spinouses and the disc levels are related.

Counting the Vertebrae

Before the involved nerve (i.e., the protruded disc) can be matched with the proper vertebra, the spinous processes in the vicinity of the reading must be identified exactly. In this procedure there can be no room for error, since the outcome will determine whether or not the patient gets the correct adjustment. The method used is to locate, by palpating the spinous processes, a vertebra whose identity can be made without question, using both the vertebra's anatomical characteristics and its position to confirm its identity. Then, knowing for sure which segment is being palpated, palpate to the vertebra in question by palpating from one spinous to the next. As this is done, each adjacent vertebra is counted and identified, until finally, the identity of the one in question is known.

For instance, if a reading is marked at the level of about the fourth or fifth cervical, the axis is first palpated, being identified by its position and shape. Then, the doctor palpates inferiorward, keeping track of each segment until the one directly above the reading is reached. This vertebra, then, is the one producing the nerve pressure at that level, since its disc is at the level of the peak.

It is always wise to confirm the identity by counting from the opposite direction as well. In the above example, the patient's vertebra prominens (VP) should be palpated, using the lateral film to determine whether it is the sixth or seventh cervical. Then the vertebrae may be counted successively until the one just above the reading is again reached. The segment should be identified the same in either direction.

Any of the thoracics or lumbars may be identified by counting down from VP, or up from the fifth lumbar. The fifth lumbar can usually be differentiated from the other lumbars by its smaller spinous, and its relationship to the sacrum.

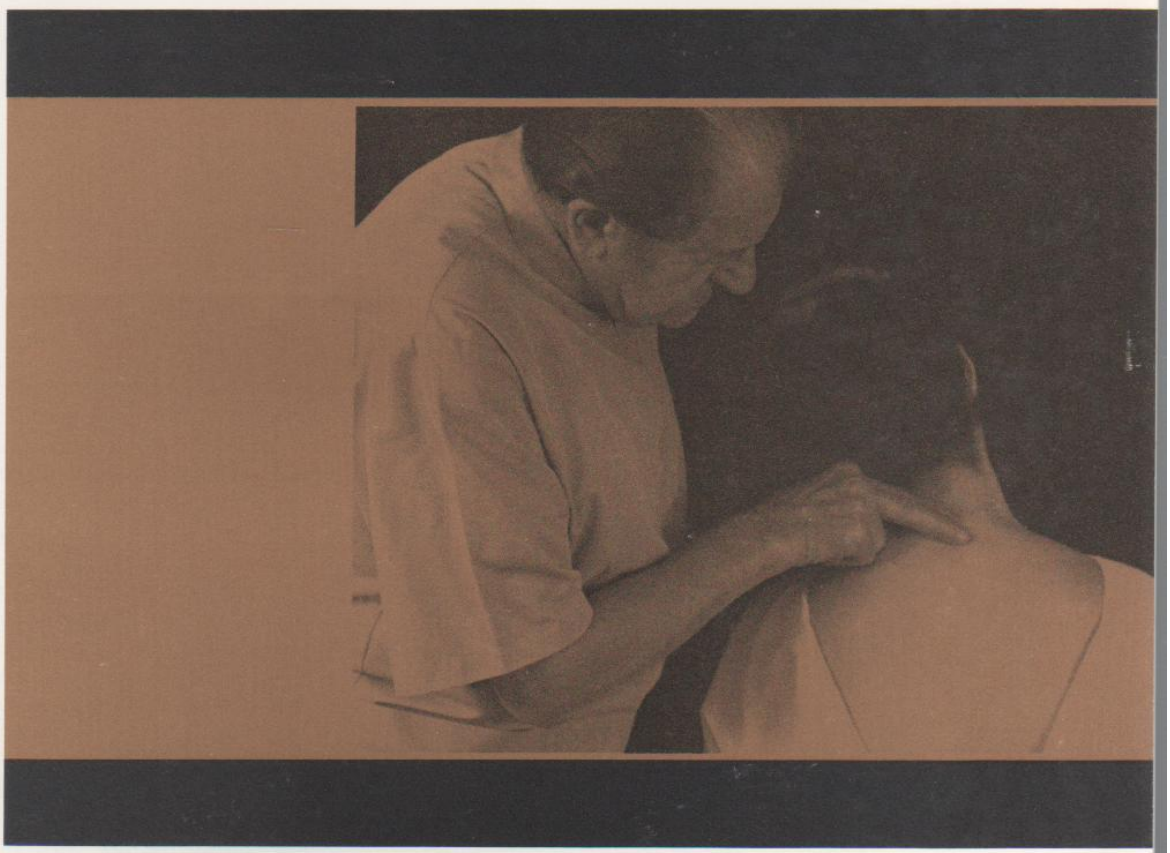
Both the lateral and the A-P films are necessary for making an accurate count. The A-P film will show not only the shapes and sizes of the spinouses, but also the exact number of segments in each area of the spine that the patient has. If it were not known that a patient had only eleven thoracics, for example, it could be very confusing. The lateral film will show VP, and also the shapes and sizes of the spinouses, as well as the distance of the interspinous spaces.

After the subluxated vertebra is identified, its listing can be determined from the film, and the segment can be adjusted. As the correction of the subluxated vertebra proceeds, over a period of days or weeks, perhaps, the intensity of the reading should become less. When the reading can no longer be discerned, the adjustments should cease. This indicates, of course, that the vertebra has been repositioned sufficiently so that the disc is no longer compressing the nerve.

Notes

Motion Palpation

Chapter 12



Gonstead Chiropractic Science & Healing Art

Chapter 12

Motion Palpation

Examination of body tissues by touching and feeling with the fingers is known as palpation. Motion palpation is feeling and evaluating movement of the bones of an articulation. In the Gonstead work, motion palpation is applied to the spine to determine whether or not a vertebra is moving normally.

The use of motion palpation serves two purposes. When instrumentation findings are inconclusive, the exact location of the subluxation can be determined. In addition, once the subluxation is located, motion palpation should be used to verify the listing, i.e., the subluxated position of the vertebra. It could be said that motion palpation provides a back-up system for both instrumentation and x-ray, and serves to confirm the location of the subluxation, and to substantiate how it is misaligned.

Motion palpation by itself will not provide the entire listing. In segments with intervertebral discs, it will disclose the direction in which the nucleus pulposus has shifted. That is, it will show lateral wedging. In the occiput, atlas, and pelvis, motion palpation will reveal which side is subluxated, and will, in the case of the atlas and occiput, show the side of laterality. The other directions of misalignment must be determined by visualization and static palpation.

Fixation

A subluxation will always show some loss of motion. In chiropractic terminology such a hypomobile vertebra is called a fixed vertebra, or a fixation. The term fixation is used relatively, for the loss of motion could either be great or slight. There will always be some motion remaining, however, since complete immobilization causes ankylosis to take place. For instance, when a joint is fixed surgically (arthrodesis), artificial ankylosis is produced. In the final stages of disc degeneration, a vertebra will sometimes be completely immobilized, and ankylosis will occur naturally. At this stage an adjustment is neither indicated nor necessary, since articular inflammation subsides, and instrumentation readings will not be found. However, such long-standing degeneration may produce irreparable nerve damage and permanent loss of function. As long as the film does not show ankylosis, adjusting the vertebra is indicated, since both the misalignment and the loss of motion can still be corrected.

The Cause of Fixation

A vertebra becomes fixed for a number of reasons. Most important among them is displacement of the nucleus pulposus from the center of the disc to the periphery. This applies only to segments with intervertebral discs, of course. Second in importance is the inflammatory edema that infiltrates the disc or articular capsule due to tissue damage. In addition, there could be ligament contractures, adhesions, and other contributing factors.

Fixations and subluxations are interarticular ligament problems. The ligaments are responsible for fixing the bones in a misaligned position. There is some current thinking in chiropractic that suggests that vertebrae are fixed and subluxated in a misaligned position because of muscle contraction. Proponents of this theory advocate treating the muscle contraction to reduce subluxations. But in the Gonstead work, we maintain that muscle contraction is an effect instead of the cause of fixation and subluxation.

Muscle contraction will not hold bones in a fixed or subluxated position. When the knee is fixed, for example, and the leg cannot be flexed or extended, it is not the extensor or flexor muscles which hold the knee in the fixed position. It is the condition of the interarticular ligaments which restricts the motion and will not allow the bones to return to their normal alignment. The same is true with the spinal articulations.

Fixation from Edema

When damage of the interarticular ligament occurs, whether the ligament is an intervertebral disc or, in the case of the sacroiliacs, atlas, or occiput, where an articular capsule is involved, edematous fluid infiltrates the tissues and produces fixation. When a vertebra with an intervertebral disc is subluxated, edema produces turgidity of the disc and diminishes the overall motion of the vertebra. The movement is affected quantitatively, and motion palpation of the segment will confirm that the vertebra is subluxated.

However, when the atlas or occiput is subluxated, the movement is affected qualitatively as well as quantitatively. If motion palpation reveals relative fixation on one side as opposed to the other, laterality is determined. For example, if the left lateral mass is fixed in comparison to the right lateral mass, the atlas has subluxated on the left side, which signifies left laterality. The opposite is true for right laterality. The same principle applies to the condyles, the fixed side indicating laterality.

Motion palpation of the atlas and occiput is very important because instrument readings for the two segments will be found in very close proximity. Finding the fixed lateral mass or condyle will reveal which of the two is subluxated, allowing for either the atlas or the occiput to be adjusted.

In motion palpation of the pelvis, a comparison of one sacroiliac joint is made with the other, to determine which of the two is more limited in motion. The subluxated side will be relatively fixed compared with the opposite side. Sometimes, both sides will be fixed, as with In-Ex or Ex-In, as well as other listings. In such a case, both sacroiliacs will require adjustment.

Pelvic listings must be determined from the radiograph, or, when none is available, from visualization and static palpation. Posteriorly rotated sacrum involvements (P-R, PI-R, P-L, PI-L) must also be differentiated from ilium problems by the x-ray, or from visualization and static palpation.

Fixation from Nucleus Displacement

When a vertebra is properly aligned, and its disc is structurally normal, the nucleus pulposus will be in the center of the disc. The central position of the nucleus allows the vertebral body to pivot freely around it in all directions. The extent and kind of movement permitted by the segment is controlled largely by the shape of the vertebra, particularly the articular processes. The type of movement will be different throughout the various areas of the spine. In any given vertebra, there may be differences in the degree of flexion and extension, but when considered bilaterally, the type and amount of lateral movement should be the same on either side. When the vertebra is subluxated, and the nucleus is displaced from the center of the disc, lateral movement will be affected. In flexion and extension, the spinous process will move considerably, but it will not deviate from the center line. With lateral flexion, however, the spinous process will move from the center line of the body. It

is these movements of the spinous process that are evaluated when motion palpation is applied.

Flexion and extension will vary with the individual and according to the area of the spine. Both movements will be quite free in the cervical and lumbar regions, and limited in the thoracic spine. When the nucleus is displaced from the center of the disc, the normal movement will be diminished. Evaluation of the spinous movement during flexion and extension is useful in confirming the location of the subluxation, but it will not reveal the direction of misalignment.

Ordinarily, when the nucleus pulposus is displaced, it will migrate from the center line of the body to either the right or left side. When this occurs the vertebral body will become fixed in a tilted position. In addition, the movement of the vertebra will be affected since the pivotal action of the nucleus will be lost.

When the nucleus is intact, and the vertebra is laterally flexed, the spinous process will be rotated to the side opposite of flexion. When the vertebra is flexed laterally to the right, the spinous process will rotate to the left, and vice versa. The spinous will be rotated just as far to the right as it will to the left when the vertebra is flexed to the opposite side.

When the vertebra is subluxated, however, and the nucleus is displaced to the side, lateral flexion to that side will be greatly diminished, and rotation of the spinous to the opposite side will not occur. If the nucleus slips to the right, for example, producing a misaligned position of PRS or PLI-T, the spinous process will not travel to the left with right lateral flexion, but will travel to the right with left lateral flexion. Therefore, by palpating the degree of right and left rotation of the spinous during lateral flexion, and comparing one side with the other, the doctor will learn to which side the nucleus has migrated, and will know the lateral wedging portion of the listing. That is, if the spinous goes further to the right with left lateral flexion than to the left with flexion to the right, he will know the listing is either PRS or PLI-T. If the spinous goes further to the left than to the right while flexing to the opposite side respectively, he will know the listing must either be PLS or PRI-T.

If the spinous movement is equal in both directions, then the nucleus probably has not slipped laterally. The listing in such a case would not include lateral wedging, and would probably be PL, PR, PL-T, or PR-T.

In addition to lateral wedging, there are two other directions of misalignment to be considered. Posteriority, a part of every subluxation where an intervertebral disc is involved, can be assumed, and is represented by the first letter in the listing (P). Remaining is the third direction of misalignment, that of body rotation. When the vertebral body is rotated to one side, the spinous process is displaced laterally to the opposite side. The direction of spinous laterality is listed as either R or L, and is represented by the second letter of the listing.

The side of body rotation, and the opposite side, that of spinous laterality, are determined by visualization. As the body rotates to one side, the transverse process on that side will rotate posteriorward. The posteriority of the transverse can easily be visualized by comparing the paravertebral muscle masses that cover both transverse processes. The muscle mass that overlies the posterior transverse of the vertebra in question will be more prominent than the anterior process of the opposite side. The rotation of the vertebra that is subluxated must always be compared with the vertebra below it. If the entire lumbar spine is rotated due to a rotatory scoliosis, for example,the greater or lesser degree of rotation of the vertebra being considered would have to be evaluated visually. Once the side of body rotation is known, spinous laterality can be listed as the opposite side.

Errors in Palpation

Motion palpation is an art and must be practiced to perfection. In the beginning, most doctors palpate with too much force. The light touch is not only preferred, but essential. Since the patient is palpated before he is adjusted, the manner in which he is palpated will condition him for the adjustment. If the doctor hurts him during the process with too much pressure, he will probably expect pain during the adjustment, and be tense as a result. The doctor should be aware that subluxations infer inflammed and tender tissues, which should be handled with care. It is not necessary to compress the superficial tissues so that the underlying bone is made sore. Instead of centering his attention on the underlying tissues being palpated, the doctor should concentrate on feeling the movement. Too much pressure will also affect the doctor's ability to perceive by deadening the sensory endings in the finger tips.

There are a number of other mistakes that are commonly made in the application of motion palpation.

Nearly every patient will attempt to take an active role in the movement of his body when he is being

palpated. He will want to assist in the moving, believing that he is being cooperative and helpful. But the doctor should remind the patient to remain passive, and to let the doctor do the moving. If the patient moves himself, his muscles will be contracted, which will interfere with your ability to palpate through them. Also, the patient might not move himself through the entire range of motion of the segment being investigated, and this could lead the doctor to a wrong interpretation.

Another error often made during motion palpation is to draw improper conclusions from observing the gross motion instead of feeling the motion of one segment. For example, while palpating the seventh cervical for lateral flexion, the patient's entire neck may flex further to the left than to the right, while in reality, the seventh cervical itself might flex further in the other direction. Because the doctor sees the patient's head go far to the left, he may assume that the nucleus of the seventh cervical is displaced to the right. This may be a false assumption. It must be stressed that to properly evaluate the motion of a vertebra, its reference point must be the vertebra below.

Hypermobility

It was said that a subluxated vertebra will always be hypomobile. The question often arises as to whether or not a hypermobile segment is a subluxation. Hypermobility is always found in an area of compensation. Because there is a loss of motion in one area of the spine due to a subluxation, another area compensates for this loss by increasing its range of motion. In order to do this, the segment's disc must be functioning properly. Hence, no inflammation will be present, and there will be no nerve involvement.

The hypermobility is accomplished by stretching of the ligaments which normally would restrict movement. This allows the individual to maintain full range of motion in his spine for the time being. Eventually, however, as the subluxation remains uncorrected, and its motion becomes less and less, the compensating segment will lose its ability to adapt. It too may become a subluxation, and other areas of compensation will need to develop. Through this process of acute subluxations developing into chronic ones, and new subluxations forming in previously compensating areas, there is a gradual and progressive loss of spinal function.

From Acute to Chronic

In the acute subluxation, motion is often very limited due to the turgidity of the disc and surrounding tissues. As time passes, the edema may lessen and movement will increase somewhat. If the subluxation is not corrected, the amount of movement will again decrease in conjunction with the disc degeneration. Eventually, adhesion formation and other desiccating changes will take place until finally, after all motion is gone, ankylosis will occur.

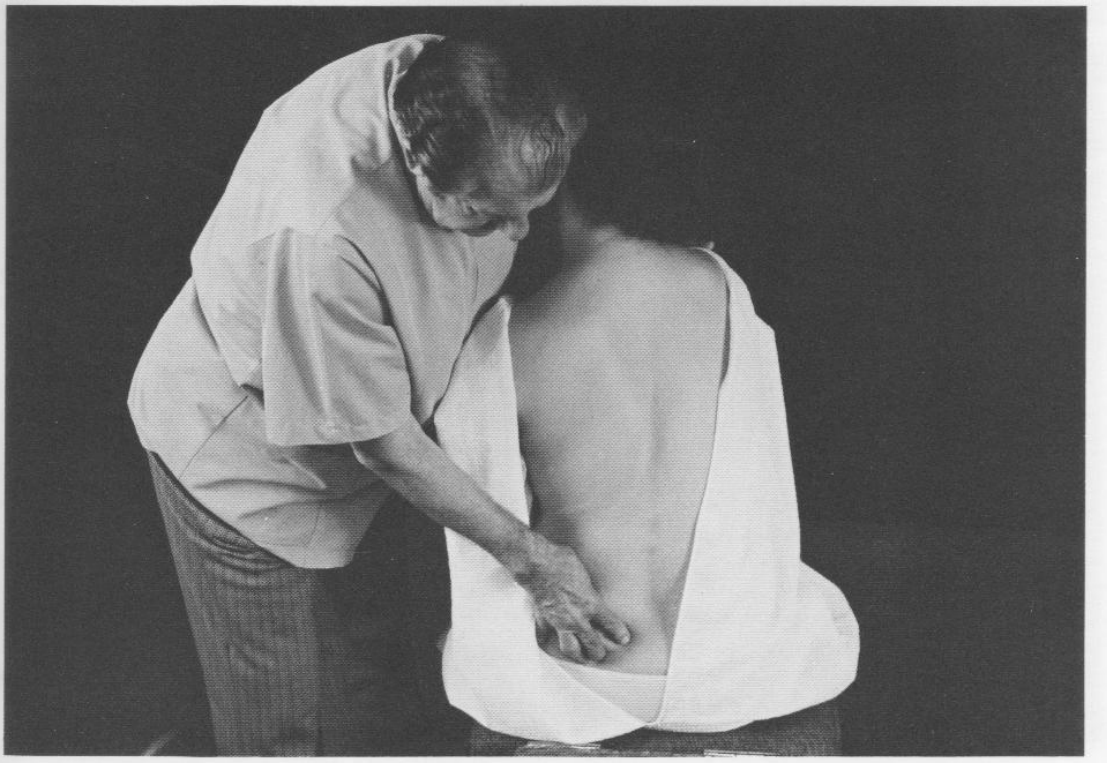
Motion Palpation Technique

Pelvic Palpation

Motion palpation of the pelvis is applied to the sacroiliac articulations, and is used to determine the side of fixation. One sacroiliac joint is almost always more fixed than the other, and is considered the subluxated side. In rare instances both sides will be equally fixed, and each will require correction. The patient should be seated during motion palpation of the pelvis. In palpating the left sacroiliac joint, the doctor will stand on the left side of the patient. His right hand will be placed over the left sacroiliac joint, while his left hand holds the front of the patient's right shoulder, as shown in figure 300. The palpating hand is situated so that the middle finger is placed on the PSS, and the index finger is placed on the sacrum immediately across from the PSS (Fig. 300). The doctor then rotates the patient's trunk to the left by maneuvering the shoulder with his left hand (Fig. 301). The trunk may be slightly flexed at the waist as well as rotated. These movements will normally produce motion at the sacroiliac joint, causing the fingers to separate as shown in figure 301. After the left sacroiliac joint is palapted, the doctor should move to the right side of the patient and check the right sacroiliac joint with his left hand. The patient's trunk is then rotated to the right side. It may be necessary to go back and recheck the left sacroiliac before deciding which is the fixed side. Rotation of the patient's trunk may actually be applied in both directions, that is, to the right and left side, when palpating any one sacroiliac articulation. However, most of the detectable motion occurs when the body is rotated toward the side of the joint being tested.

Figure 300: *Palpating the left sacroiliac articulation.*

Figure 301: *As the patient's trunk is rotated toward the side being palpated, motion is palpated between the sacrum and ilium.*



It should be re-emphasized that it is important that the patient remain passive during the maneuver, and that the doctor perform the movements. Also, in order to detect the full range of motion in the joint, especially when joint movement is slight, the doctor's palpating hand and forearm muscles must be completely relaxed.

After it has been determined which sacroiliac is the fixed – and subluxated – side, confirmation may be made by palpating the joint for edema. The subluxated sacroiliac joint will also be more tender than the opposite side when digital pressure is applied. The patient may be queried as to which side is more tender, or, enough pressure may be applied that a pain response is elicited. However, creating pain may produce anxiety and tenseness in the patient. If heavy pressure is used, the sensitivity of one side must be compared with the other side.

In addition to fixation, edema, and pain, another factor to correlate is the side of lumbar body rotation. Normally, the subluxated ilium will be the one on the side of body rotation, which must be ascertained by either motion palpation, the radiograph, or by both.

After the doctor has resolved which sacroiliac is subluxated, he will want to list the ilium on that side. The listing is almost always determined by the x-ray. However, if none is available, the listing should be determined by visualization. In fact, the listing should always be confirmed visually even when a film has been taken.

Visualization of the pelvis is done from behind with the patient standing. For determining pelvic rotation, the width of one ilium is compared with the other. The distance from the medial border of the PSS to the lateral border of the gluteus maximus muscle is evaluated on both sides, the wider one being the In ilium, and the more narrow one the Ex. In determining AS and PI misalignment, the gluteal fold on the PI ilium will be lower, i.e., more inferior, than the AS ilium. Conversely, the gluteal fold will be higher on the AS ilium.

Observation of the differences in these surface features should enable the doctor to accurately list the ilium on the fixed side.

When it has been determined that the fixed ilium is listed ASIn, it should be ascertained whether or not the sacrum on that side is rotated posteriorly. It should be recalled that posterior rotation of the sacrum on the side of an ASIn ilium will require adjustment of the sacrum instead of the ilium, providing the ilium misalignment is slight. Posterior rotation of the sacrum is usually quite obvious topographically. The distance from the sacral tubercles to the PSS will be increased on the posterior side, and the sacrum will be obviously posterior when visualized. The involved articulation is also usually extremely tender and edematous.

Lumbar Palpation

Motion palpation of the lumbar spine is utilized to confirm fixation and to substantiate lateral wedging. The patient should be in the sitting position, and the doctor may palpate from either side. The index finger of the palpating hand is placed in the interspinous space between the vertebra being evaluated and the segment below it (Fig. 302). The opposite hand controls flexion and extension of the spine, and is placed on the patient's shoulder as shown in figure 303. If the segment is fixed, the motion normally found between the spinous processes during flexion and extension will be diminished.

The amount of movement normally found between two segments will vary considerably among individuals. Some patients will have good flexibility throughout the spine,whereas the "normal" motion found in another person's spine may be much less. Such factors as heredity, age, and certain metabolic disorders which affect the muscles or the spine as a whole may play a part. Therefore, it will be necessary to palpate not only the segment being checked for fixation, but the ones above and below as well, so that a "normal" can be established for that individual.

To determine lateral wedging, the index finger of the palpating hand is placed on the spinous process of the vertebra being evaluated, while the middle finger is placed on the spinous of the segment below (Fig. 304). The doctor's opposite hand is again placed on the patient's shoulder, and controls lateral flexion of the spine (Fig. 305). As the spine is laterally flexed, rotation of the spinous process to the opposite side is palpated. The spinous will rotate further toward the side of lateral wedging.

Once the side of lateral wedging has been determined, lumbar body rotation must be evaluated for the remaining portion of the listing. This is ascertained by visually comparing the posteriority of the transverse processes, as has been explained earlier. Spinous laterality will be to the opposite side of body rotation.

Figure 302: *The palpating index finger is placed in the interspinous space.*

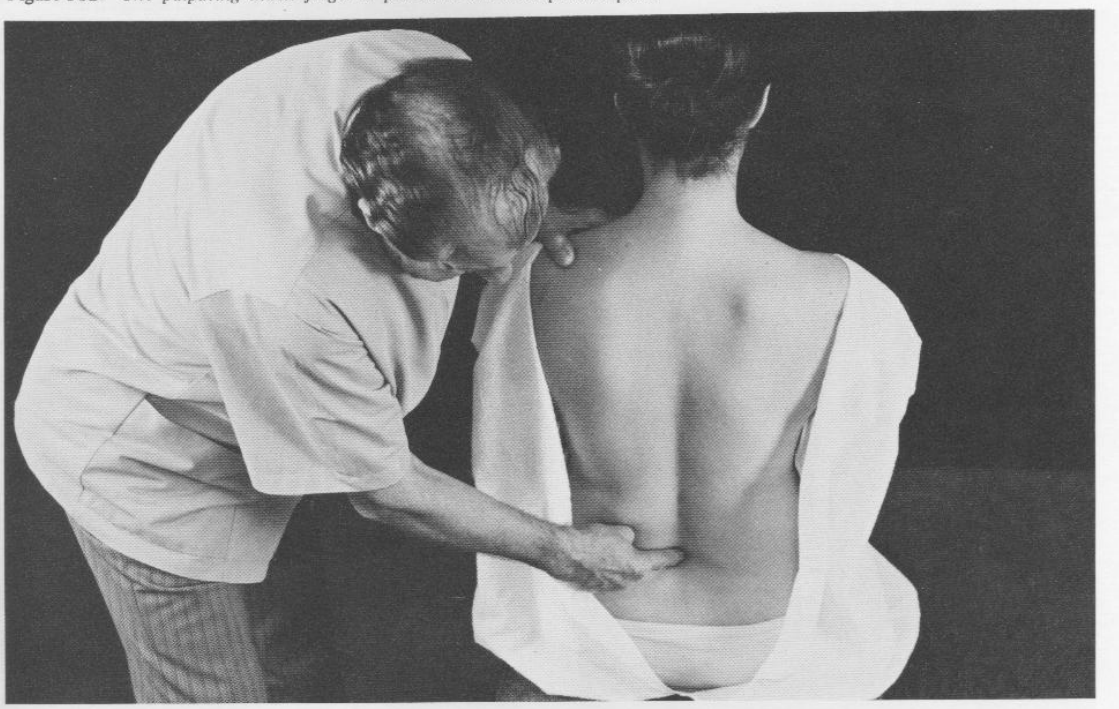


Figure 303: *Motion is palpated as the spine is flexed and extended.*

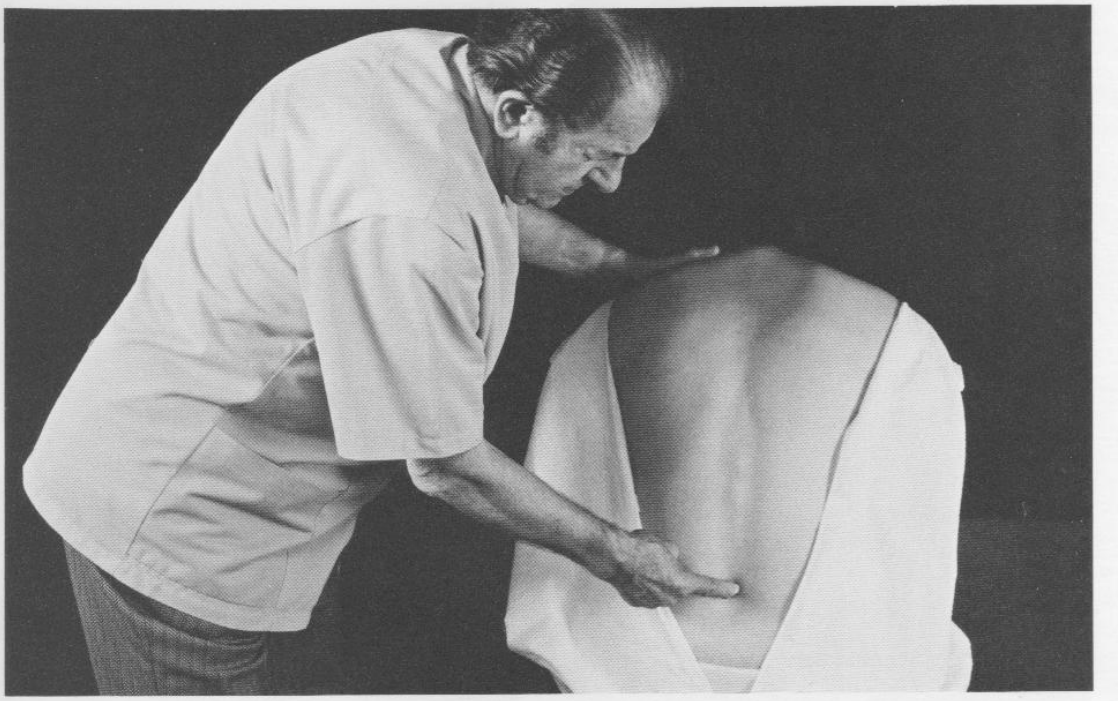


Figure 304: *Lumbar motion palpation for lateral wedging.*

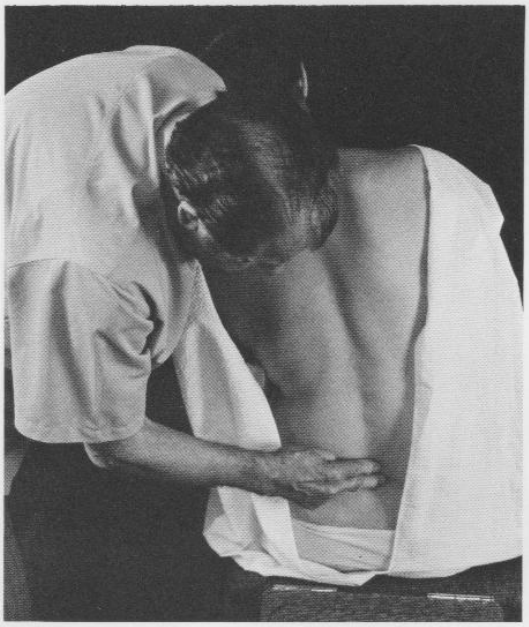


Figure 305: *As the spine is laterally flexed to the right, spinous rotation to the left is palpated.*

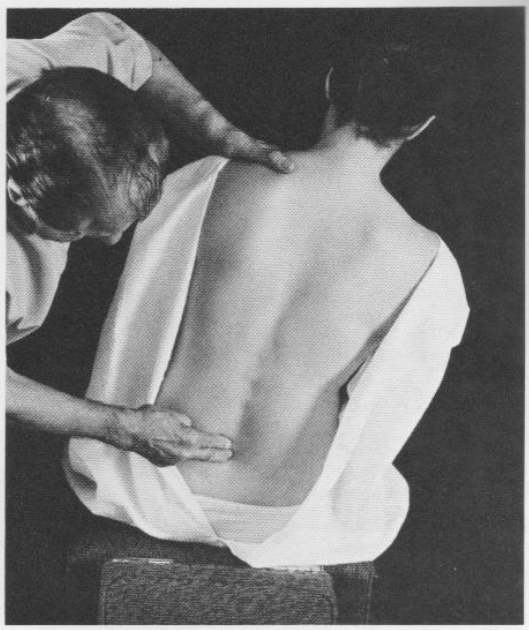


Figure 306: *Thoracic motion palpation for lateral wedging.*

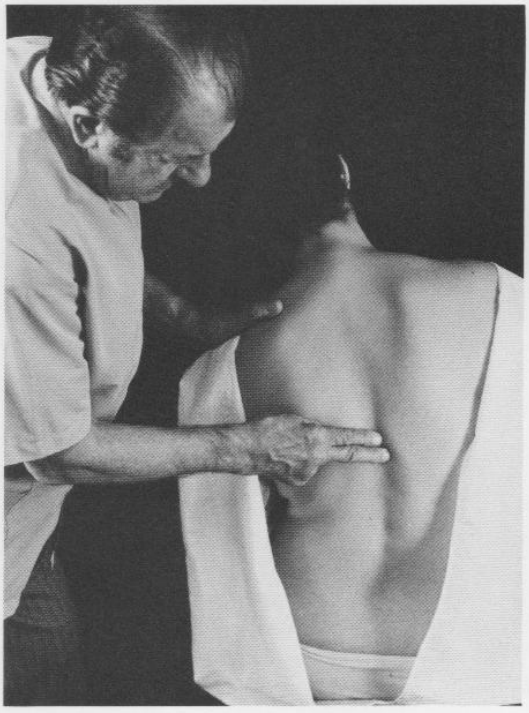


Figure 307: *Spinous movement to the right is compared to spinous movement to the left.*

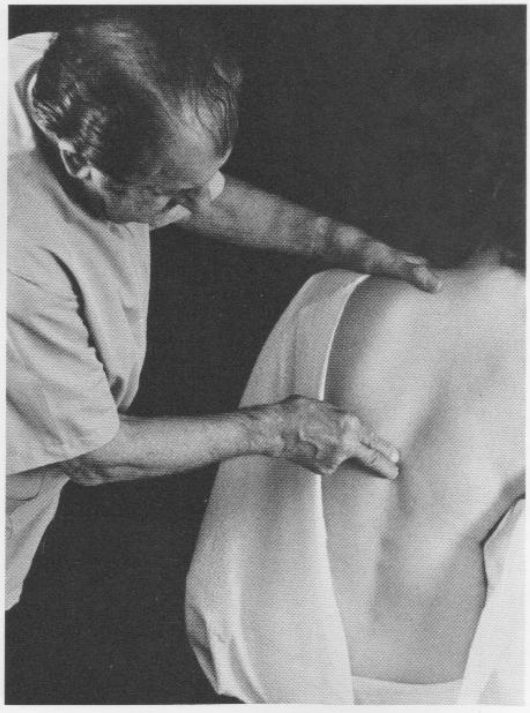


Figure 308: *The tenth thoracic spinous moves normally to the left when the spine is flexed laterally to the right.*

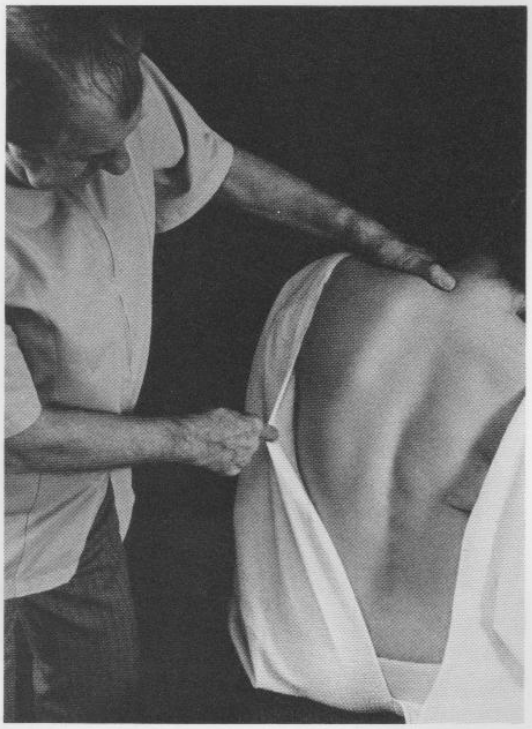
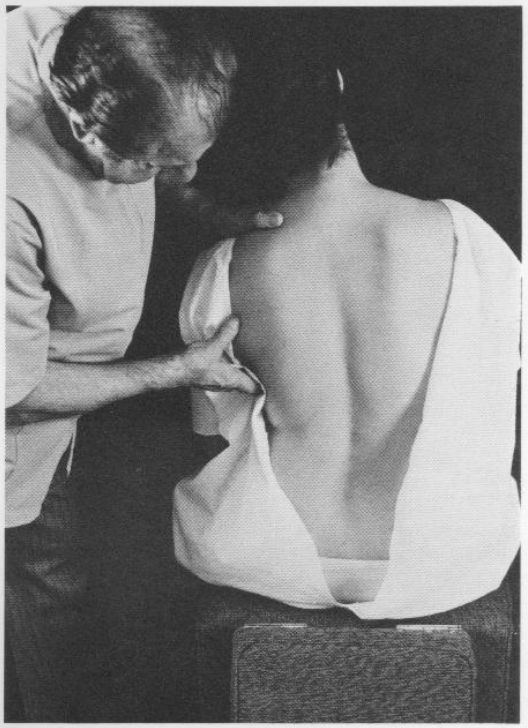


Figure 309: *The tenth thoracic spinous movement is limited when the spine is laterally flexed to the left.*



Thoracic Palpation

The thoracic spine is palpated in exactly the same manner as the lumbar spine. The patient usually remains seated, and the doctor may stand on either side. Again, the index finger of the palpating hand is placed on the spinous process of the vertebra being evaluated, and the middle finger rests on the spinous of the segment below (Fig. 306). The doctor's other hand flexes the patient's spine laterally by moving the shoulder to the left and right (Fig. 307). As always, the spinous will move further toward the side of lateral wedging. Body rotation is determined visually as in the lumbar spine. Spinous laterality is to the opposite side of body rotation.

Because there is considerable lateral flexion movement in the thoracic spine, lateral wedging can often be determined visually as well as through motion palpation. For this procedure the patient may be either sitting or standing. The doctor flexes the patient's spine to the left and right, as shown in figures 308 and 309. At the level of fixation, lateral flexion will be much greater toward one side as opposed to the other. In figure 308 there is normal flexion of the spine to the right at the level of the tenth thoracic. When flexed to the left, however, as shown in figure 309, flexion is limited at that level. This indicates that the nucleus has migrated to the left of the center line, limiting lateral flexion to that side. The listing, therefore, would either be PLS or PRI-T.

The thoracic spine may also be flexed and extended to confirm the level of fixation, as is true in the lumbar spine. The procedure, that of palpating the movement of the spinous process by placing the index finger in the interspinous space, is the same. Movement is not as readily detectable, however, since the ribs and the shape of the facets limit flexion and extension considerably in the thoracic spine.

Cervical Palpation

Motion palpation of cervical segments C2 through C7 is similar to that of the thoracic and lumbar spines.

Figure 310: *Cervical motion palpation for lateral wedging.*

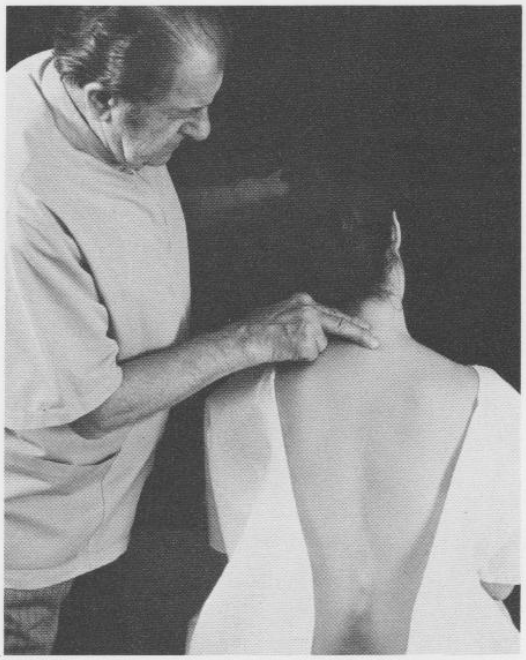


Figure 311: *Spinous rotation to the right is compared with rotation to the left.*

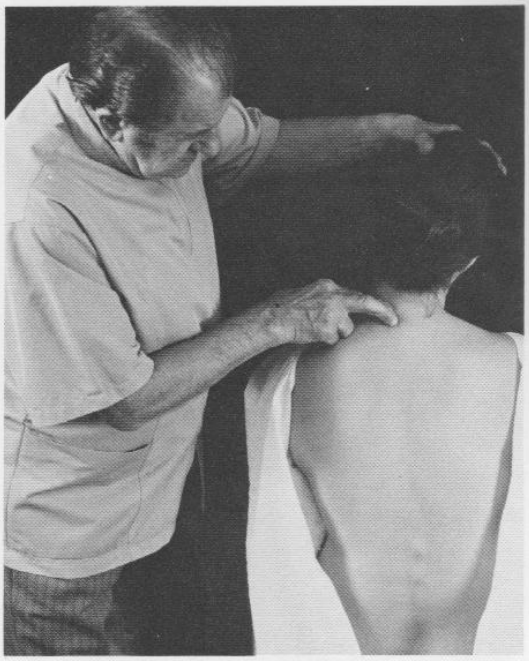


Figure 310 illustrates palpation of the sixth cervical vertebra during left lateral flexion. It can be seen that the spinous rotation to the right is quite limited as compared to rotation to the left, depicted in figure 311. Although the lateral wedging is also evident by the degree of lateral flexion of the neck in this instance, it should be remembered that the gross movement is not always indicative of the actual spinous motion. Much of the right lateral flexion seen in the neck could be produced by compensating hypermobile segments above. It is what is felt when palpating that is important.

As in the other areas of the spine, visualization of body rotation by comparing transverse processes will reveal the side of spinous laterality. But spinous deviation in the cervical spine can also be determined by palpating spinous laterality when the head is rotated. The spinous would normally rotate just as far to one side as it would to the other when the head is rotated in the opposite direction. However, when a cervical segment is subluxated, spinous rotation will be limited in one direction. If the head is rotated to the right, for example, and the spinous does not freely rotate to the left, then the spinous would be listed PR (Fig. 312). The degree of spinous rotation must always be determined by comparing movement on both sides. Figure 313 illustrates right rotation of the spinous process as the head is rotated to the left.

Flexion and extension of the cervical segments may be evaluated by palpating the interspinous space, just as is done in the lumbar and thoracic spines.

Atlas Palpation

Motion palpation of the atlas will reveal the side of fixation. This will also be the side of laterality. Since the motion of the atlas is predominantly rotation on the axis, the degree of rotation of one lateral mass is compared with that of the other. The index finger of the doctor's palpating hand is placed on the transverse process of the atlas, while the middle finger palpates the transverse process of the axis (Fig. 314). As the head is rotated to the *opposite* side, the atlas transverse will normally rotate further forward than will the axis transverse process. When the atlas is fixed on that side, the rotation of the transverse process will be limited as compared to the opposite side. Figure 315 shows limited rotation of the atlas when the head is rotated to the left. This indicates an AIR or ASR atlas. Inferiority or superiority of the atlas is best determined radiographically, although the general inclination of the head when observed laterally will usually be indicative.

Figure 312: *Spinous laterality in the cervical spine can be determined by comparing spinous movement during head rotation.*

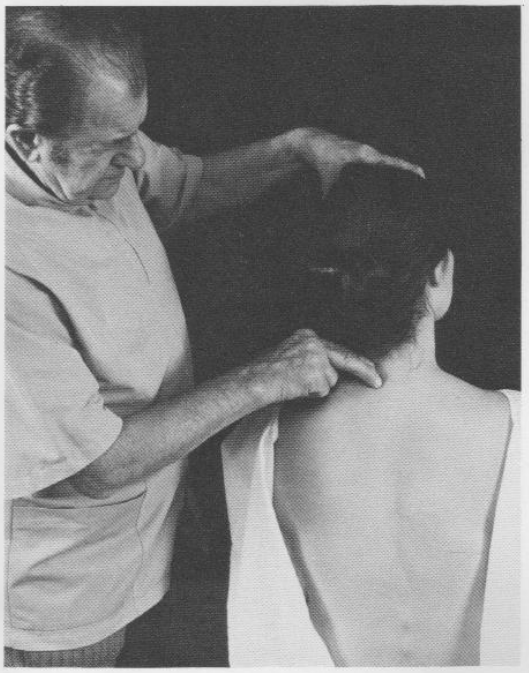


Figure 313: *The sixth cervical spinous moves further to the right than to the left, indicating PR.*

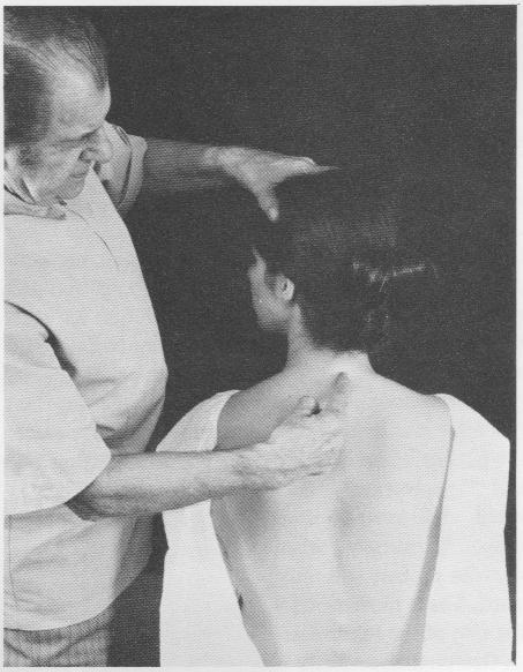


Figure 314: *The motion of the atlas transverse is palpated in relation to the axis transverse.*

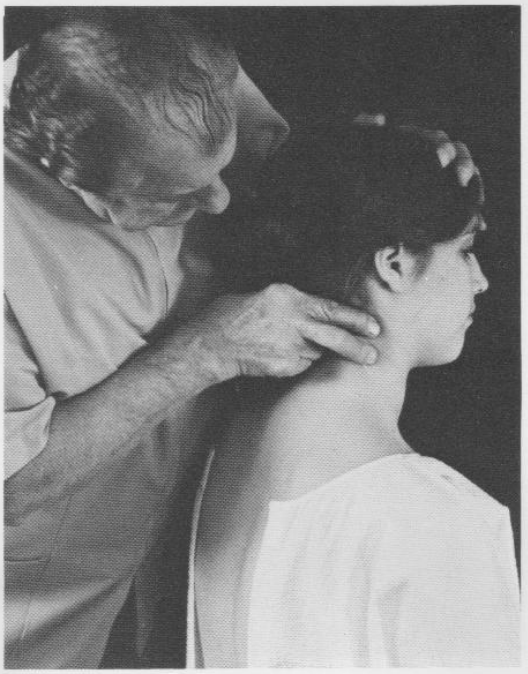
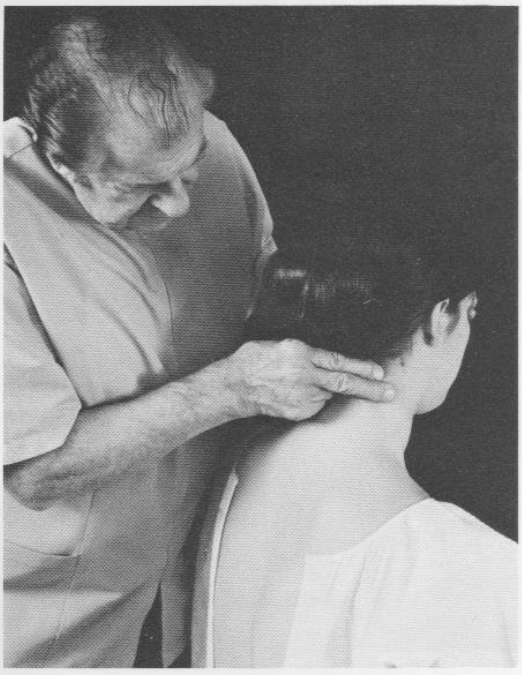


Figure 315: *As the head is rotated to the opposite side, the forward rotation of the atlas transverse is evaluated.*



Rotation of the atlas is determined by visualization. When the atlas rotates anteriorward on the side of laterality, the condyle on that side will be elevated. The patient should be observed while standing. The mastoid process on the side of anterior rotation will be more superior than that of the opposite side. Posterior rotation on the side of atlas laterality will cause inferiority of the mastoid process on that side. Figure 316 could indicate either an A-LA or an A-RP atlas.

Occipital Palpation

Occipital subluxation produces fixation of the condyle on the side of laterality. Motion palpation will indicate this by revealing decreased motion between the mastoid process and the transverse process of the atlas during nodding of the head. With the index finger on the mastoid process, and the middle finger on the atlas transverse, the doctor lowers and elevates the patient's chin with his opposite hand (Figures 317 and 318). Normally, the mastoid process will be elevated and move posteriorward when the chin is raised. Conversely, when the chin is lowered, the mastoid process will move anteriorward and inferiorward. These movements will be greatly diminished on the side of the subluxated condyle.

Occipital superiority or inferiority should preferably be determined radiographically, although observing the position of the head from the lateral aspect is usually quite indicative. Occipital rotation is revealed by observing the patient from behind while standing. When the occiput is subluxated, the mastoid will be elevated on the side of posterior rotation, and lowered on the side of anterior rotation.

Figure 316: *Atlas rotation is evaluated with the patient standing when a radiograph is not available.*

Figure 317: *Limited motion between the mastoid process and the atlas transverse indicates occipital subluxation.*

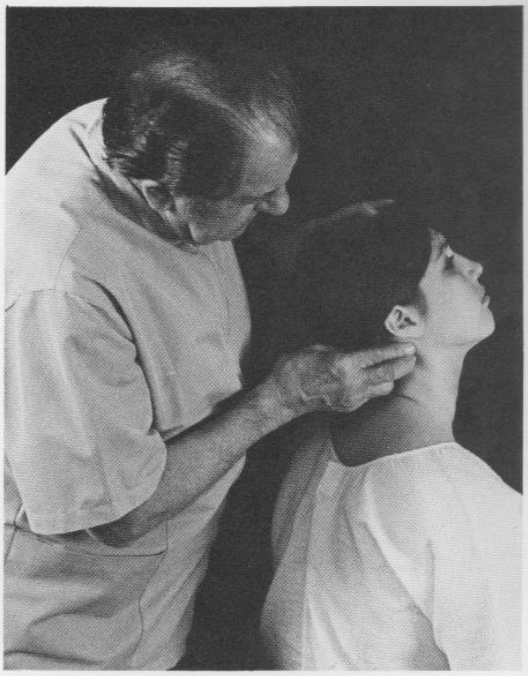
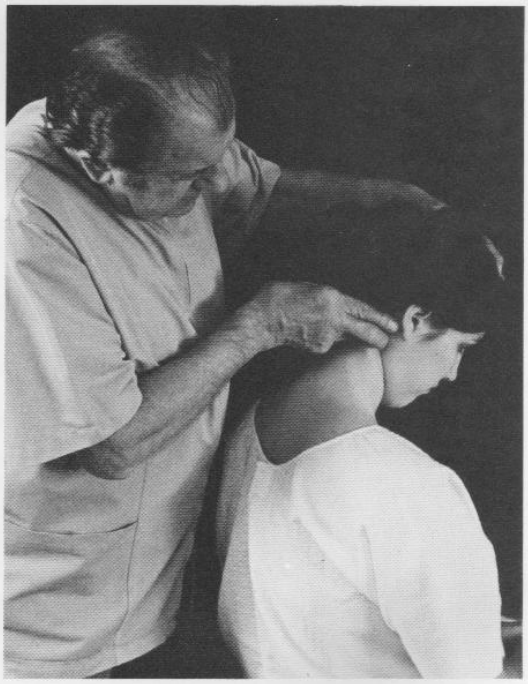
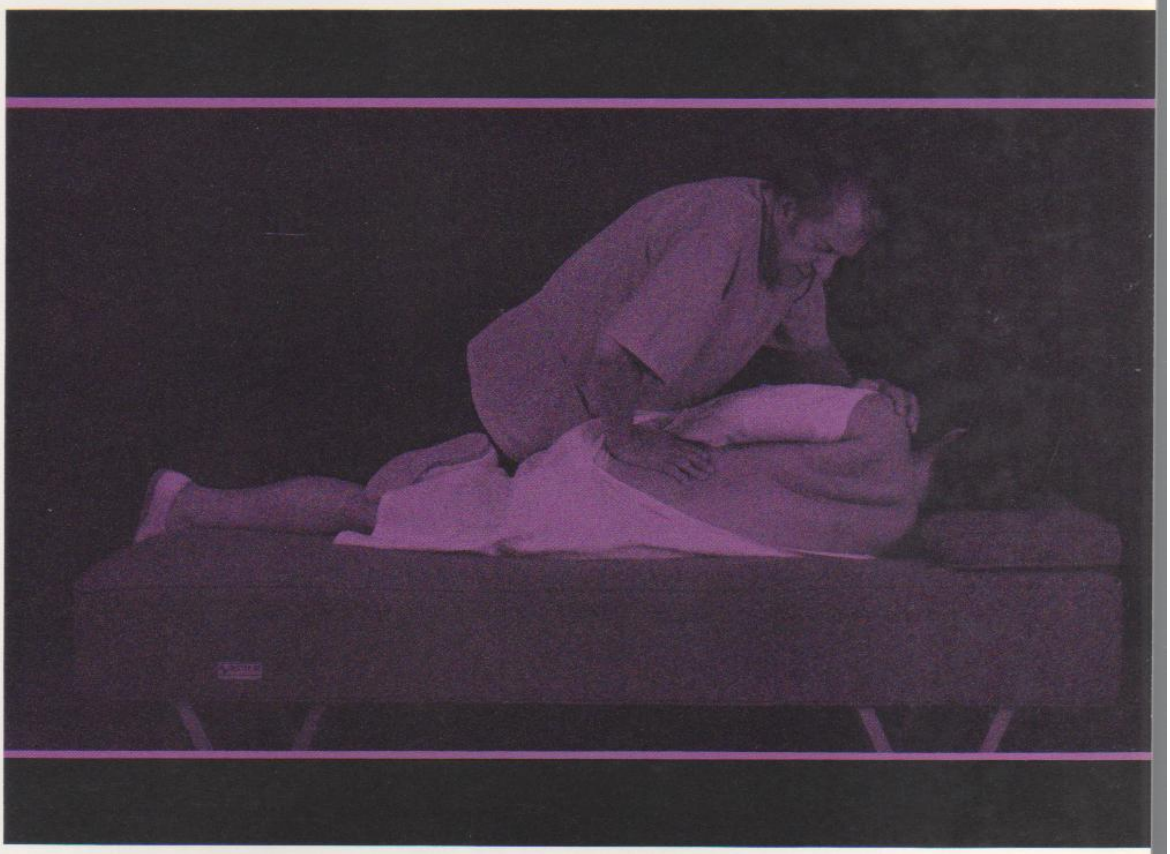


Figure 318: *A fixed condyle during nodding motion indicates the side of lateral misalignment.*



Ilium Corrections

Chapter 13



Gonstead Chiropractic Science & Healing Art

Chapter 13

Ilium Corrections

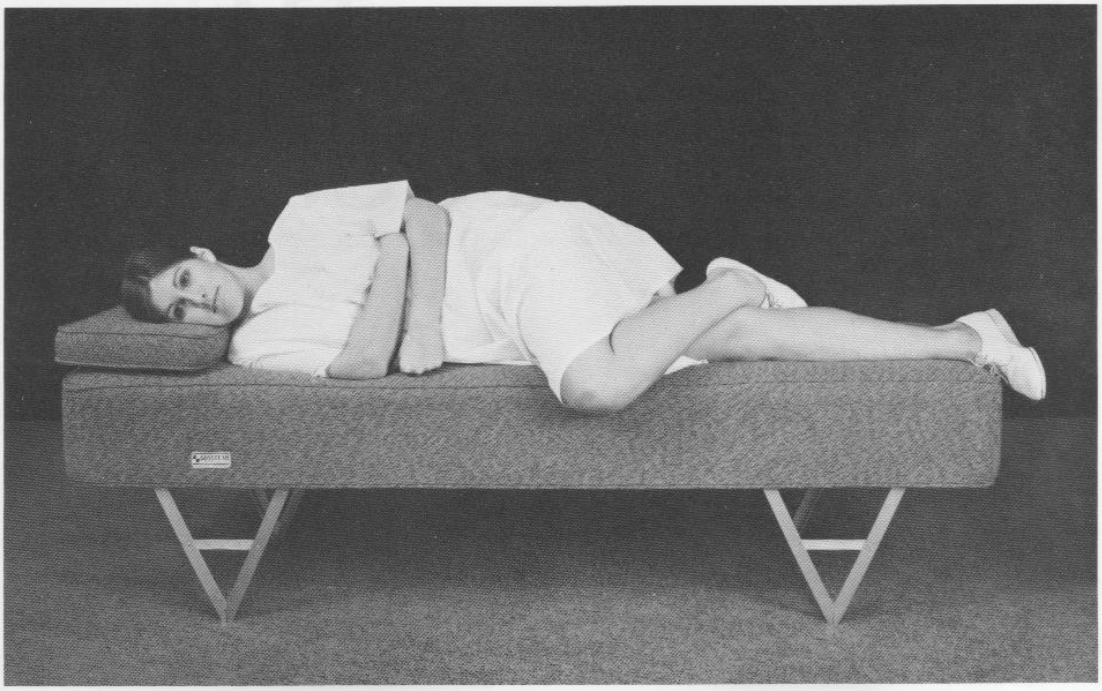
This chapter explains the procedures for correcting ilium subluxations. A great number of conditions may arise as a result of subluxation of an ilium at a sacroiliac joint. The most obvious would be from the effects of nerve dysfunction due to compression of any of the upper three or four sacral nerves. There may also be local inflammatory and compressive effects on the tissues within the pelvic cavity, resulting in functional and pathological disorders of those tissues.

In addition to these direct effects, there may be problems reflected inferiorward as well. Sacroiliac subluxation will alter the normal mechanical function of the pelvis, and cause abnormal weight distribution to the lower extremities. This could lead to problems with the hip joints, knees, or feet, as well as with other parts of the legs.

There could also be very important effects directed superiorward as a result of sacroiliac involvement. Misalignment at the sacroiliac articulation will modify the plane of the sacrum, thereby causing a loss of support for the rest of the spine. Undermining the foundation of the spine in this way will require adaptive changes to occur in the segments above. Abnormal spinal curves will develop, and certain segments will undergo compensatory misalignment. In time, some of these segments may become subluxations.

Considering all of these far-reaching and potentially deleterious effects, the great importance of sacroiliac subluxations becomes apparent. It is essential, therefore, that the doctor completely understand and master how to correct them.

Figure 319: *The Gonstead pelvic table.*



The Pelvic Table

Pelvic corrections are made on the Gonstead pelvic table, with the patient lying on his side (Fig. 319). The foam rubber used in the table has been carefully selected to meet the requirements of pelvic adjusting. Its density and thickness will comfortably support the weight of any patient, while allowing neither "bottoming-out," or rebounding of the patient's body from the thrust. Covering the foam rubber is a durable cloth fabric which minimizes surface slippage.

The table can be ordered to various heights to fit the needs of the individual doctor. The best height will allow the doctor to be comfortably relaxed and balanced while bending over the patient. This height will usually be at about the level of the doctor's knees.

Supplied with the table are two cover cloths, and a pillow for the patient's head. The cover cloths are placed at the ends of the table to prevent the patient's shoes from soiling the fabric. The pillow will be put at either end of the table, depending on whether the patient will be lying on his right or left side. The cover cloth at the end where the patient's head will be placed should be folded in half so the pillow and the patient's clothing are protected from the soiled outer surface.

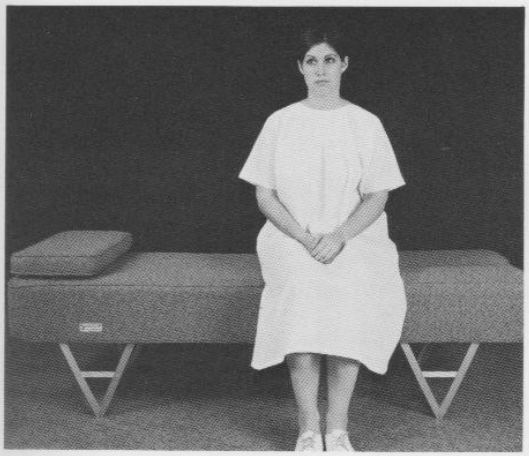
One side of the table should always be placed firmly against a wall. This gives the table additional stability when the adjustment is made. More important, perhaps, is the reassurance it gives the patient in knowing he cannot roll off the back of the table.

One end of the pelvic table is slotted to accommodate a patient in the prone position. The slot should be ignored when making ilium adjustments, as it is not used when the patient is placed on his side.

Patient Positioning on the Pelvic Table

When adjusting the patient on the pelvic table for the first time, it is best to begin with a statement similar to the following. "I would like you to lie down on your right (or left) side, close to the edge of the table, with your head on the pillow." You may suggest that they first sit on the edge of the table, and then, using their hand and elbow for support, bring their shoulder down and their legs up (Figs. 320 through 322). Both legs should first be straightened, and the arms

Figure 320: *The patient first sits on the edge of the table.*



folded as shown in figure 322. The patient should then be instructed to bend the upper leg so that the foot rests behind the knee of the lower leg. This position is illustrated in figure 323, and shows the patient ideally placed for pelvic adjustments on the pelvic table.

The importance of having the patient positioned correctly on the pelvic table cannot be overemphasized. When the patient is not properly positioned, the chances of making an effective adjustment are greatly diminished. If left to his own devices, the

Figure 321: *The hand and elbow support the body while the shoulder is brought down and the legs are brought up.*

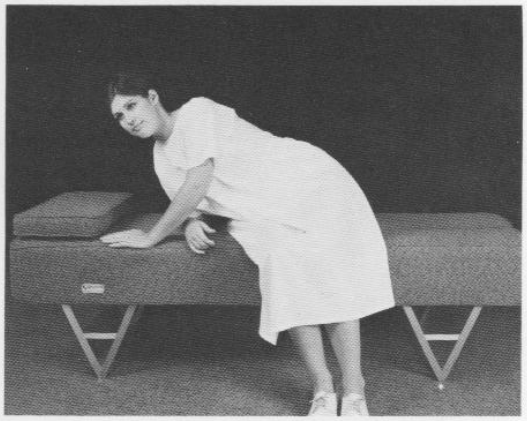


Figure 322: *Both legs are extended before the upper leg is flexed at the knee.*

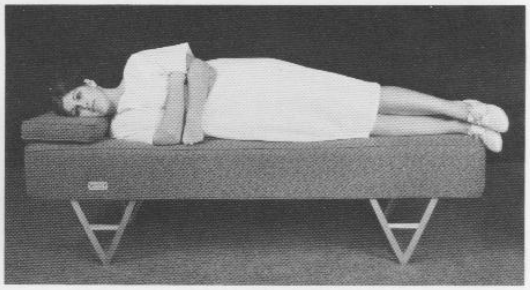


Figure 323: *The patient is ideally positioned on the pelvic table.*

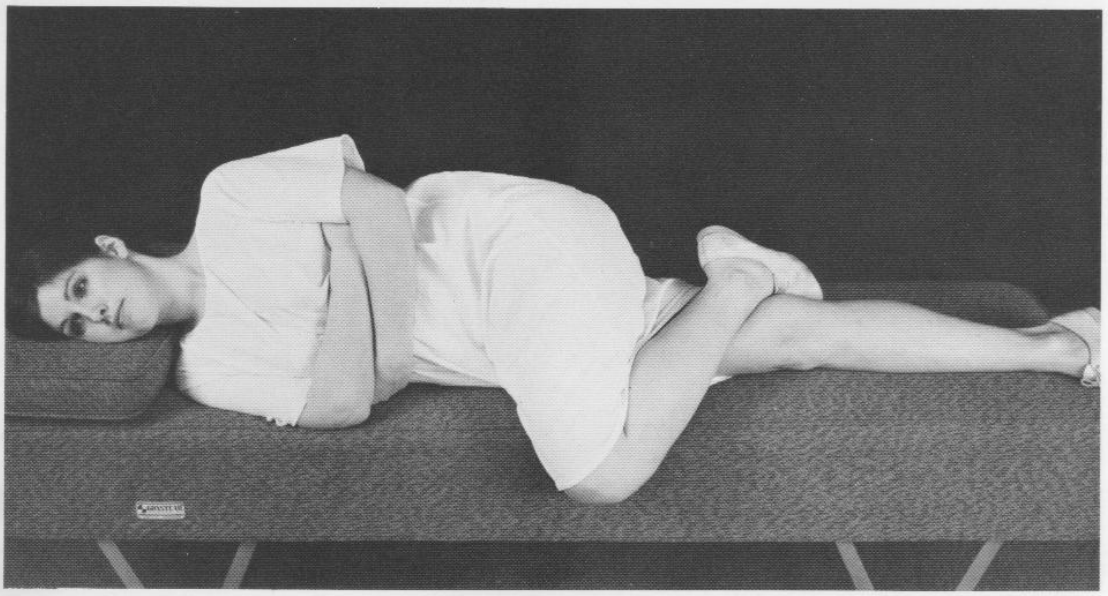
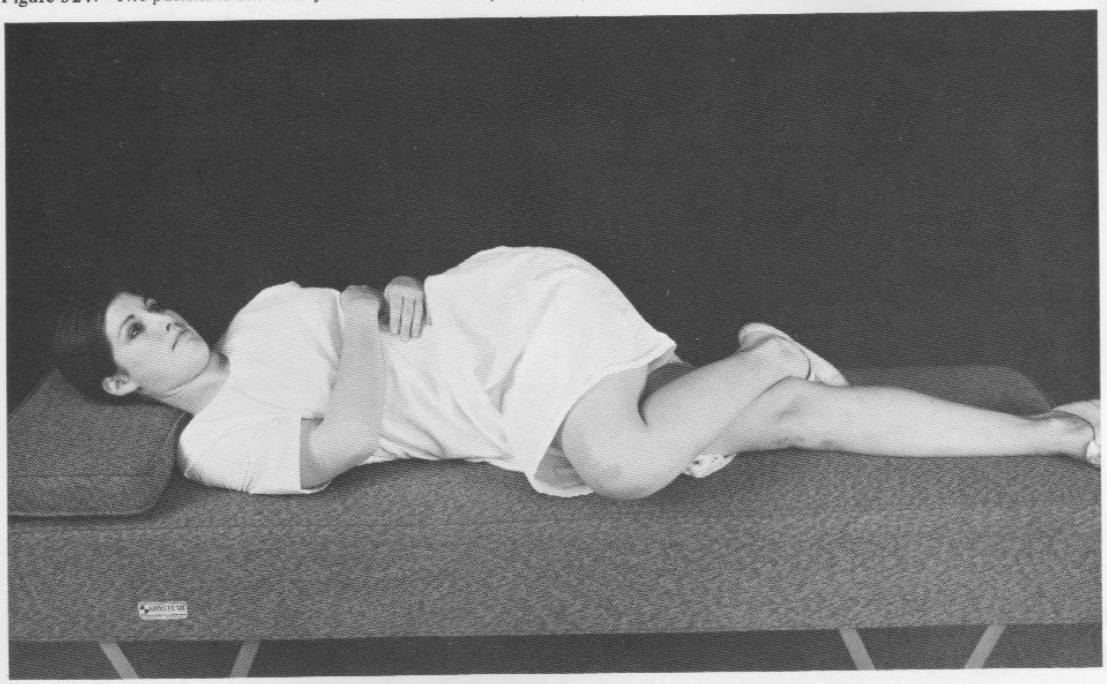


Figure 324: *The patient is back too far on the table. Her face and left shoulder are rotated back too far.*



patient will invariably assume the position in which he feels most secure. This will probably prevent the doctor from having access to, or the control he needs, over the part being adjusted. Most likely, the result will be an insufficient correction, or, perhaps, no correction at all. The following paragraphs explain some of the more commonly made errors in patient positioning for pelvic adjustments.

Positioning Errors

To increase his feeling of security, the patient will almost always want to lie further back from the edge of the table than where the doctor needs him to be. This is illustrated in figure 324. In this position the patient's pelvis will be back too far for the doctor to reach. If he does try to reach it, he will not be balanced on his feet, which will interfere with his control of the adjustment. The patient's upper knee will also be back too far on the table, and will not extend far enough over the edge if the patient is too far away from the doctor. This difference can be seen by comparing figures 323 and 324.

Another very common positioning error well illustrated in figure 324 is for the patient to be rotated too far back on the table with the upper trunk and shoulder area. This brings the lower shoulder too far forward, while the upper one is back too far. The patient is almost lying on his back with the upper half of his body. He assumes this position because he feels he is rolling away from the edge of the table, instead of rolling off. However, with this much rotation of the spinal column, the lower lumbars and sacroiliac joints will be "locked" in position. Consequently, they won't move easily when the thrust is given. The proper position will have the lower shoulder directly beneath the upper one as shown in figure 323.

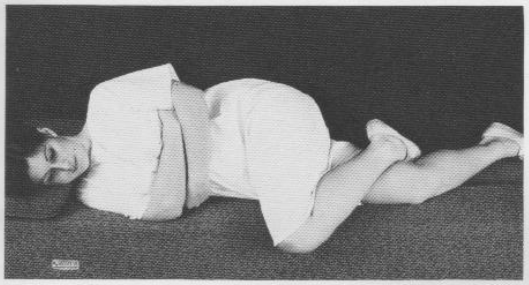
Figure 324 shows another error in positioning that will cause tension in the spinal muscles. The patient's head is rotated superiorward in order to watch what the doctor is doing. This is often done even if the upper trunk is not rotated too far backwards on the table. The best position for the head is facing directly forward as shown in figure 323.

Perhaps the worst position for the head is shown in figure 325. Here, the neck is flexed, bringing the head toward the chest. The patient does this so he can see the floor, again for security against rolling off the table. This position is particularly bad in that it tightens the spinal muscles the entire length of the spine. This is quite evident when a thrust is made in

the lumbar spine, for the head will whip backwards, with the neck going into extension involuntarily. For maximum relaxation, the head should be neither too far forward nor back too far on the pillow.

Figure 325 also illustrates what is probably the most frequently encountered positioning error when the patient is being adjusted on the pelvic table. The inferior leg is flexed at the knee, bringing the foot back toward the far side of the table. This is also done by the patient for reassurance against rolling off the edge. Even though everything else may be done correctly, this one malpositioning of the leg will cause the patient not to be relaxed, making the adjustment very difficult to accomplish, if not impossible. The inferior leg must remain straight, as shown in figure 323.

Figure 325: *With the head forward and the bottom leg back, the spinal muscles will not be relaxed.*

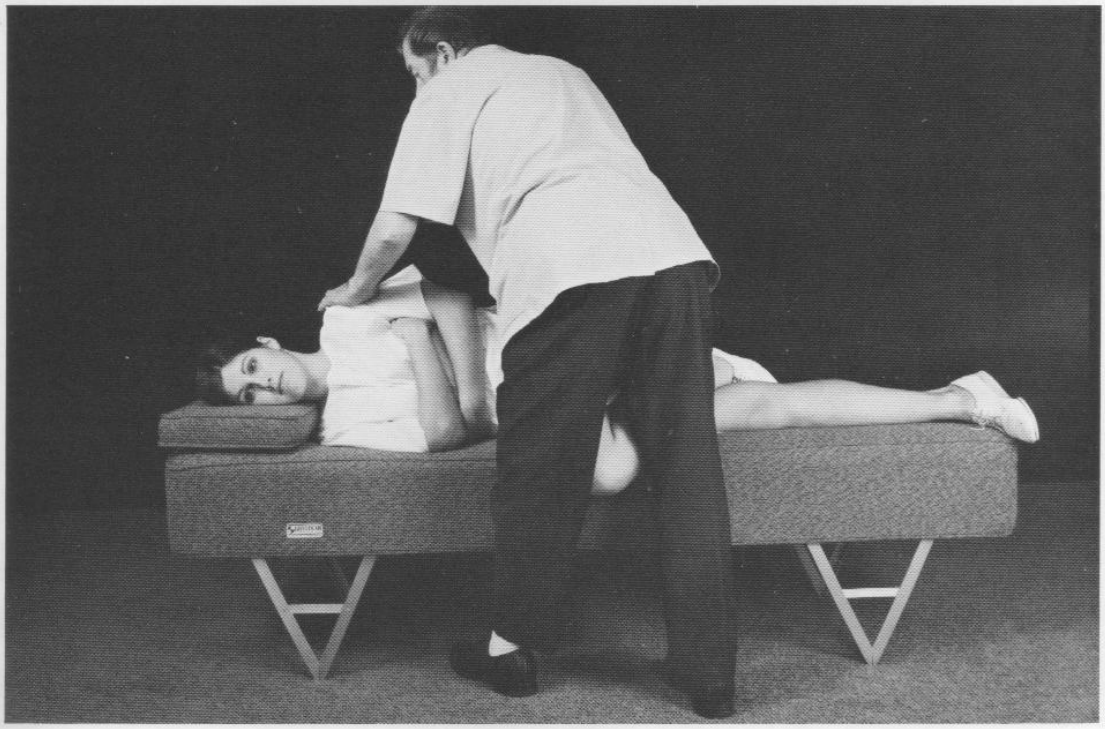


External Pull Moves

Adjusting the Ex Ilium Pull Move

The preferred method for adjusting an Ex ilium is with the involved side down, that is, with the patient lying down on the side of the subluxated ilium. The external ilium is then "pulled" toward the sacrum to realign it to its normal position. With the patient properly placed in position, the doctor stands close to the table with his knees straddling the patient's upper, flexed knee. The doctor's body and feet are turned diagonally, at about a forty-five degree angle, toward the patient's head (Fig. 326). The doctor should be positioned so that he will be balanced and comfortable when he bends forward, reaching under

Figure 326: *The doctor is in position. He straddles the patient's knee and places his stabilization hand on the shoulder.*



the patient's pelvis.

If the patient is lying down on his right side, the "contact hand," that with which the thrust is made, will be the doctor's right hand. The thrust will be made with the left hand when the patient is lying on his left side. The opposite hand, referred to as the "stabilization hand," is placed on the anterolateral aspect of the patient's upper shoulder. This hand applies moderate traction to the patient's spine for removing the slack from the tissues before the thrust is made (Fig. 326).

All ilium adjustments are executed with what is referred to as a "pisiform contact". This means that the thrust is made with the doctor placing the pisiform bone of his contact hand on the ilium to be adjusted. The exact point upon which the pisiform bone is placed on the ilium is called the "contact point."

The contact point for an Ex ilium is directly lateral of the posterior superior spine. To properly place the contact hand, the doctor first lifts the patient's pelvis from the table with his stabilization hand, and slides his contact hand under the subluxated ilium. The contact hand is positioned so that the pisiform is a few inches lateral of the PSS. The stabilization hand then releases the patient's pelvis, and the patient is told to allow the full weight of his pelvis to rest on the doctor's contact hand. (If the patient is tense, he will not be relaxed sufficiently for an effective adjustment. The doctor should be able to detect this by the amount of weight on his contact hand. If the weight of the patient is light on his contact hand, the doctor may have to remind him to "let go" before the thrust is made.) The stabilization hand is then placed on the patient's shoulder, as shown in figure 326. Mild traction is applied to the patient's spine by the shoulder being moderately and gradually pressed superiorward and backwards very slightly. If too much pressure is used on the shoulder, the patient will resist the force by using a countering pressure of his own. Excessive shoulder pressure will not only be uncomfortable for the patient and make him tense, but it will also tighten the sacroiliac articulations, thereby hindering the adjustment. At the same time that light traction is applied to the shoulder, the contact hand is drawn very lightly medialward so that the pisiform is pulled closer to the PSS. These two simultaneous actions, the traction on the shoulder and the drawing of the contact hand toward the contact point, are known as "taking out the slack". The purpose of taking out the slack is to reduce the looseness of the spinal ligaments and the tissues overlying the contact point, so that when the thrust is given, the force will move the ilium. Otherwise, the force of the thrust will be dissipated by the slackened tissues. Also, the thrust will produce a painful lashing effect on the spine if the slack is not first removed.

In deciding how much slack should be removed from the tissues, the best answer would be the maximum amount permitted by the patient just prior to his becoming tense and wanting to resist. In other words, the maximum amount that will still allow the patient to relax. Knowing just when this point is reached is something that must be learned through experience. But more often than not, the doctor will remove too much slack rather than not enough. This results in tightly bound ligaments and contracted muscles, both of which work against an easy, effective adjustment.

Sometimes, particularly if the patient is obese, or has very lax tissues, the pisiform will go beyond the contact point medially, as the slack is removed with the contact hand. The doctor must then reposition his contact hand by again lifting the patient, and reaching further under the patient's pelvis.

The final step in preparation for the actual adjusting of the Ex ilium is the stabilization of the patient's pelvis by the doctor resting his knee on the patient's knee. More accurately, it is the doctor's shin that rests on the patient's thigh (Fig. 327). This procedure is often misinterpreted to mean that when the thrust is given, an additional force is applied to the patient's upper leg by the doctor's leg. When the pull move is executed by the contact hand, it may appear that force is also used by the doctor's leg, but such is not the case. The doctor's leg merely stabilizes the patient's pelvis as the thrust is given. Otherwise, the thrust would lift the patient's pelvis off the table, and no corrective adjustment would occur. In figure 327 the doctor is balanced on his left leg, and this leg also supports most of his weight. His right leg is resting lightly on the patient's thigh and hip. Because the thrust rotates the subluxated Ex ilium around the longitudinal axis of the patient's spine, the left ilium must also rotate around this same arc. The left ilium rotates downward as the Ex ilium rotates upward. The doctor's stabilizing leg guides this downward rotation of the patient's left ilium, but no force is used in this rotational movement except with the thrusting hand. If force *is* used, it is very likely that external subluxation of the left ilium will occur.

Figure 328 illustrates the setup of the doctor and patient for the Ex ilium pull move. The thrust must

Figure 327: *The doctor stabilizes the patient's pelvis with his knee.*

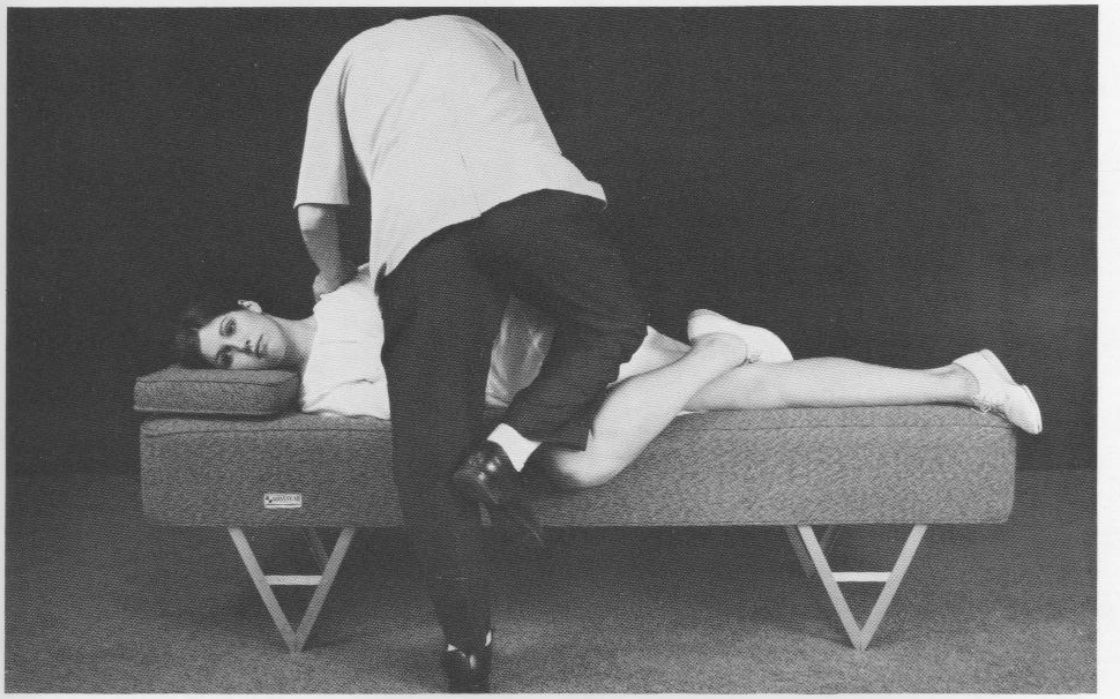
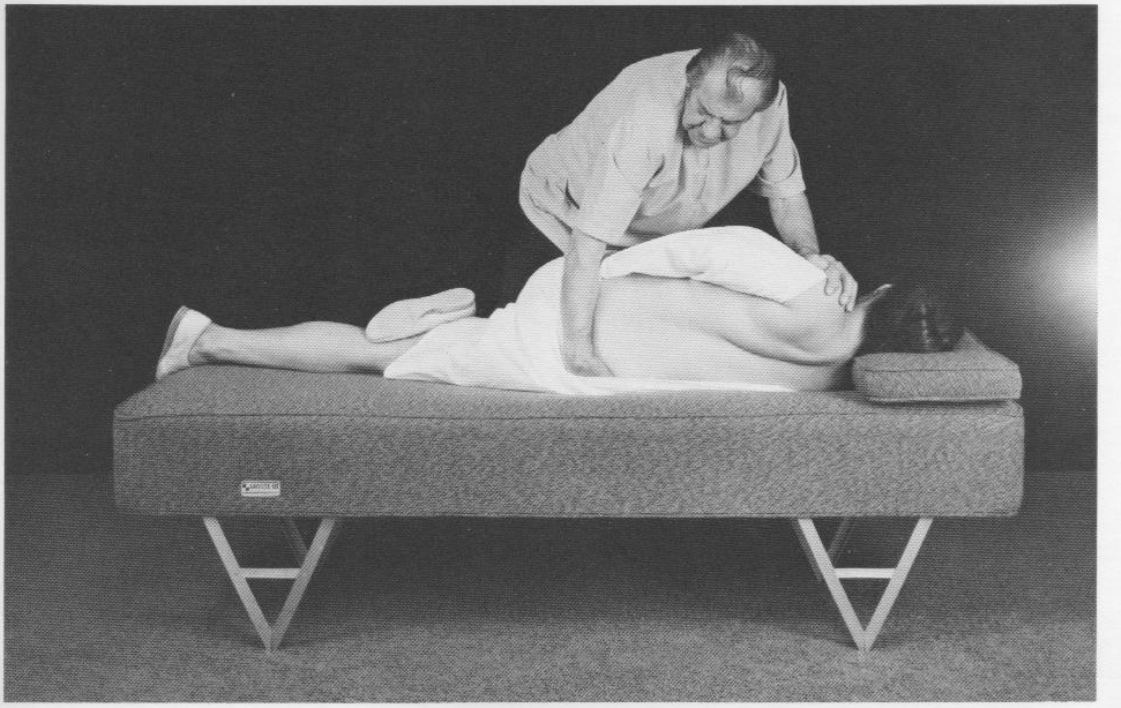


Figure 328: *The doctor-patient setup for an Ex Ilium, pull move.*



be quick, and its depth must be "controlled". That is, the depth, or distance that the thrust is given is not determined merely by the amount of resistance that the subluxated ilium allows. Instead, the doctor must first have in mind a certain amount of movement that he wants to have take place, and then follow through with that distance without going beyond it. To execute a thrust without anticipating and controlling the amount of depth needed will often cause discomfort, if not injury, to the patient. For example, an Ex ilium could be changed to an In ilium instead of being corrected, and an ASR atlas could become an ASL atlas. This is a very important concept in adjusting technique, and is often disregarded by many doctors.

The direction of thrust for the Ex ilium is directly medialward. It would follow a line running through the center of both sacroiliac articulations at the level of the posterior superior spines.

In figure 329, the setup and direction of thrust are represented on a skeletal specimen. It can be seen how the longitudinal axis of the doctor's right arm bisects both sacroiliac joints. As the thrust is given, the Ex ilium is brought medialward toward the center of the sacrum. A close-up view of the position of the contact hand is shown in figure 330.

Figure 329: *Contact for an Ex (pull) Ilium.*

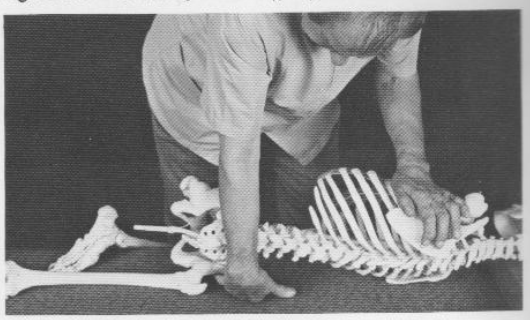


Figure 330: *Adjusting the Ex Ilium, pull move.*

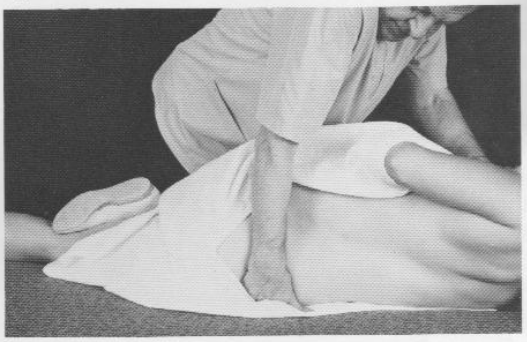
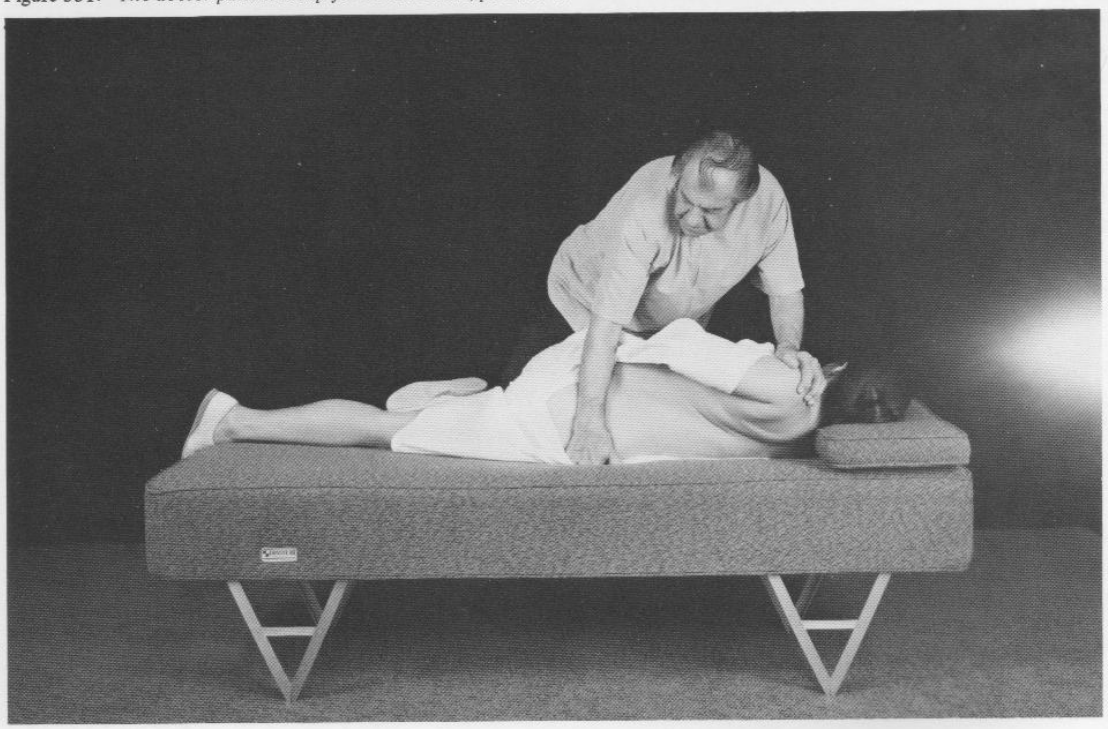


Figure 331: *The doctor-patient setup for a PIEx Ilium, pull move.*



Adjusting the PIEx Ilium Pull Move

The PIEx ilium pull move is a modification of the Ex pull move. The contact point for the PIEx ilium is directly lateralward and inferior of the posterior superior spine. After the slack is removed from the tissues, the doctor's pisiform should be just below and lateral of the PSS. The fingers of the contact hand are below the PSS instead of directly lateralward (Fig. 331). The direction of thrust is now superiorward as well as medialward. If the listing indicates a great amount of PI misalignment relative to the amount of Ex misalignment (e.g., $PI_8 Ex_2$), then the direction of thrust is altered accordingly, and favors a superiorward direction. On the other hand, a $PI_2 Ex_8$ listing would require only a slightly superiorward change in the direction of thrust from that of an Ex ilium alone (Fig. 331).

A listing of $PI_4 Ex_4$, for example, would require a direction of thrust modified approximately forty-five degrees superiorward from what just an Ex ilium would be. This same principle is applied to all of the other ilium listings as well. The doctor must shift his body position superiorward so that when he thrusts, his arm will pull his contact hand both superiorward and medialward (Fig. 331).

In figure 332 the contact and setup are shown for a $PI_4 Ex_4$ type listing on the skeletal specimen. The doctor must be balanced and relaxed, and use a quick thrust with controlled depth. As the thrust is given, there is a slight rotational movement of the pisiform in the direction that rotates the PSS superiorward. This is known as "torque," and is performed entirely by action of the wrist.

Adjusting the ASEx Ilium Pull Move

The ASEx ilium pull move is also a modification of the Ex pull move. But instead of the thrust being directly medialward, it is both medialward and inferiorward. The contact point is approximately two inches lateralward and three inches below the posterior superior spine, at the back of the acetabulum, and a few inches above the ischial tuberosity. When the contact hand is in position, the fingers will be placed above the PSS, and the pisiform will be below the PSS (Fig. 333). As the thrust is given, the pisiform is torqued in the direction that will rotate the PSS inferiorward. Figure 334 illustrates the shift inferiorward in the doctor's position, so that the direction of thrust can be executed in an inferior and medial direction.

Figure 332: *Contact for a PIEx (pull) Ilium.*

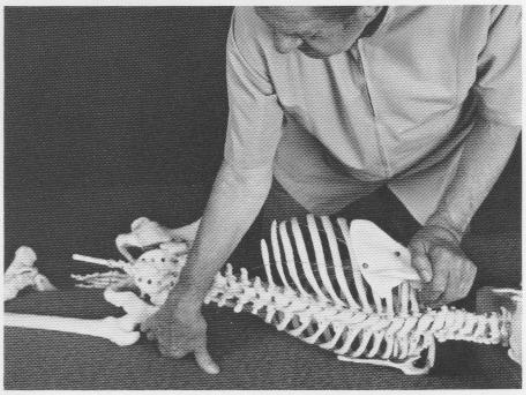


Figure 333: *Contact for an ASEx (pull) Ilium.*

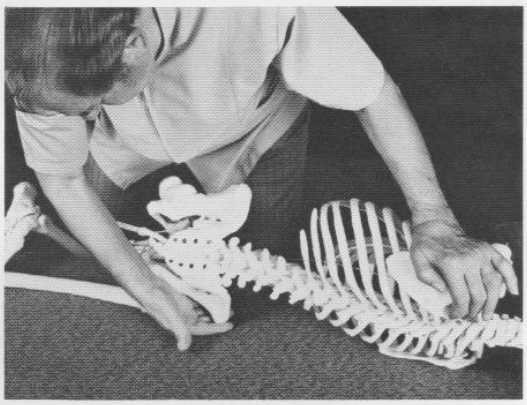
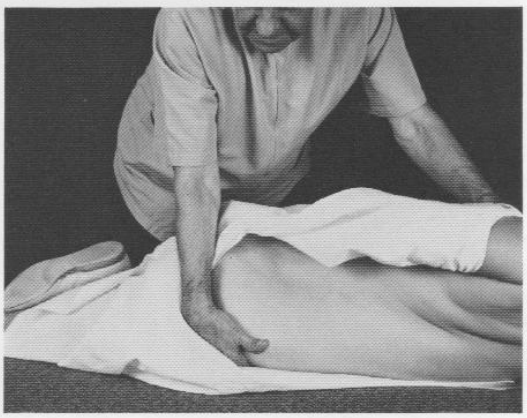


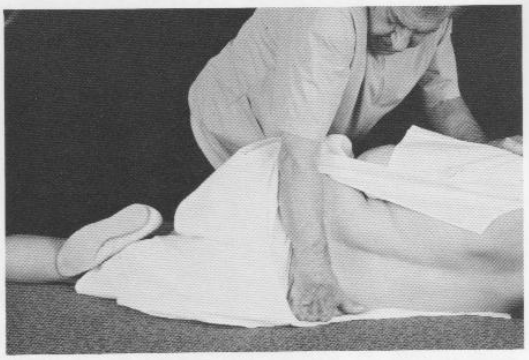
Figure 334: *Adjusting the ASEx Ilium, pull move.*



Adjusting the In-Ex or Ex-in Ilium Pull Moves

The In-Ex or Ex-In ilium is a compound subluxation involving both the right and left sacroiliac joints. To make the correction, the Ex ilium is "pulled" toward the center of the sacrum, and the In ilium is "pulled" away from the center of the sacrum. The setup is the same as the Ex ilium alone, with the exception of the doctor's forearm being placed firmly against the PSS of the In ilium (Fig. 335). The direction of thrust is directly through the center of both sacroiliac joints, with both the contact hand and the forearm applying force at the Ex and In ilia, respectively.

Figure 335: *Adjusting the In-Ex Ilium, pull move.*



Internal Pull Moves

Adjusting the In Ilium Pull Move

The In ilium can also be adjusted by a pull move, although the ilium is being adjusted away from the center of the sacrum instead of toward it. In this case the patient is placed on the table with the involved side up instead of down (Fig. 336). The contact point is the medial border of the PSS, and the thrust is applied with the distal ends of the second, third, and fourth fingers (Fig. 337). The direction of thrust is through the center of the sacroiliac articulation, directly lateralward. The doctor stabilizes the patient's pelvis by placing his leg on the patient's thigh, and a quick thrust with controlled depth is given with the finger tips.

Figure 337: *Contact for an In (pull) Ilium.*

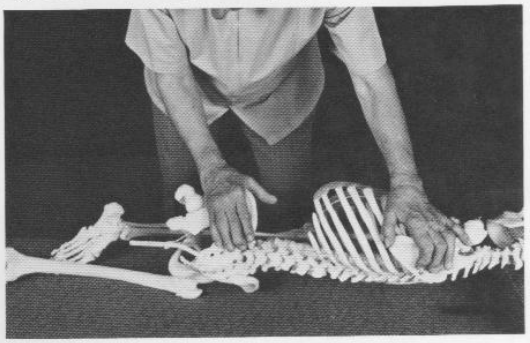


Figure 336: *The doctor-patient setup for an In Ilium, pull move.*

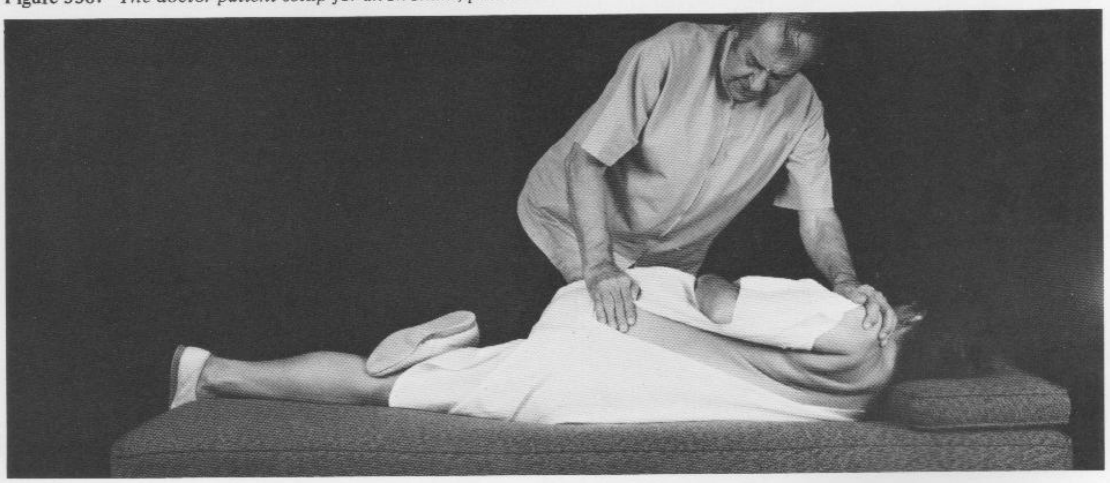
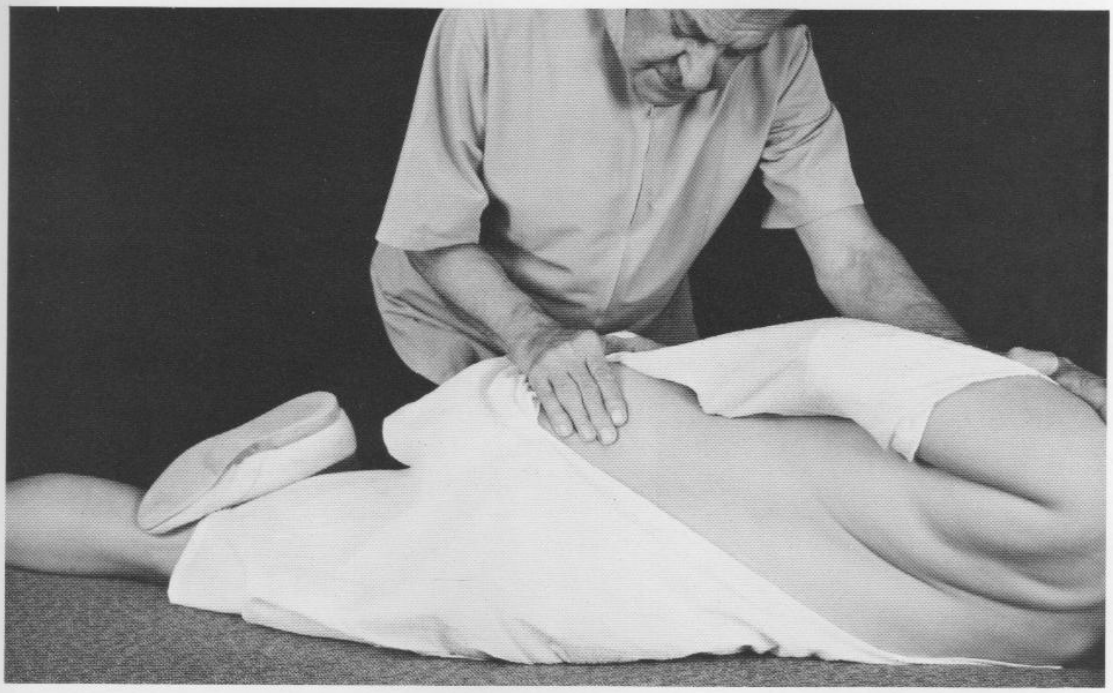


Figure 338: *Adjusting the PIIn Ilium, pull move.*

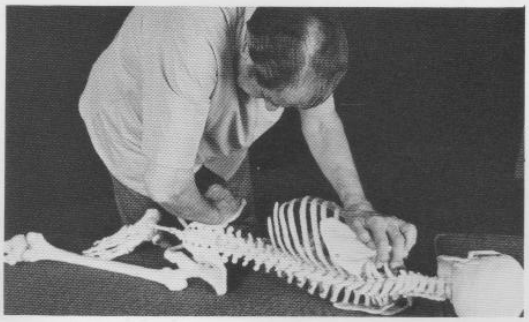


Adjusting the PIIn Ilium Pull Move

The PIIn subluxation can also be adjusted with a pull move. The procedure is exactly the same as that of the In ilium, except the contact point is the inferior-medial border of the PSS (Fig. 338). The direction of thrust will be superiorward as well as lateralward, the degree of superiority being determined by the amount of PI relative to the amount of In. In addition, torque should be applied with the finger tips in the direction that will rotate the PSS superiorward.

The ASIn ilium is not readily corrected with a pull move, the method of choice being by the "internal push move."

Figure 339: *Contact for an In (push) Ilium.*



Internal Push Moves

Adjusting the In Ilium Push Move

The designation "internal push move" implies that the In ilium is pushed lateralward, away from the center of the sacrum. This is the preferred method for adjusting an In ilium, and is performed with the patient lying down on the opposite side of the subluxated ilium. In other words, the involved side is up.

The contact point is the medial border of the PSS, just as it was with the In pull move. However, the pisiform contact is used instead of the finger tips (Fig. 339). The doctor approaches the patient in

Figure 340: *The doctor stabilizes the patient's pelvis with his hip.*

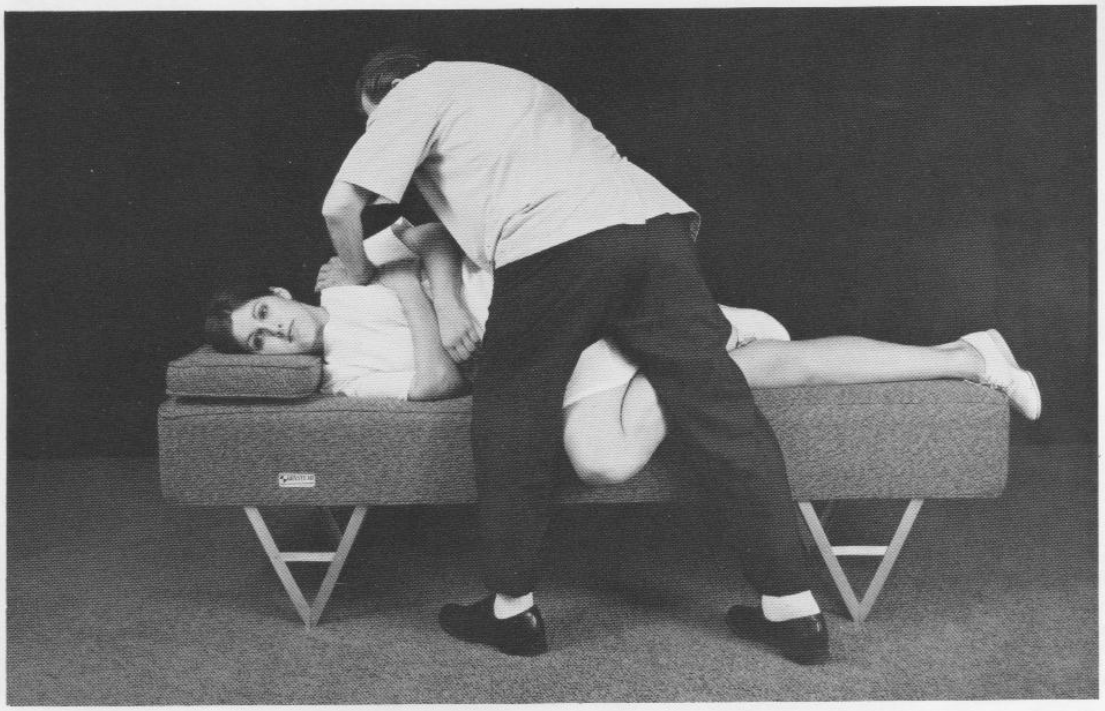


Figure 341: *The patient's shoulder should not be pushed back too far when taking out the slack.*

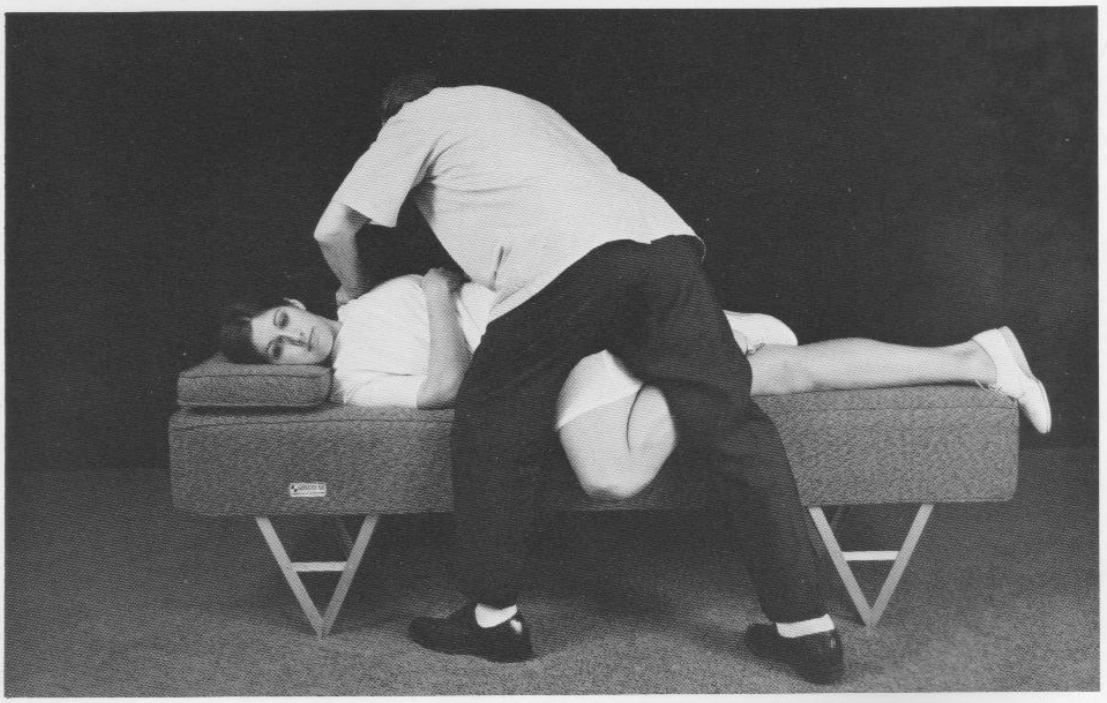
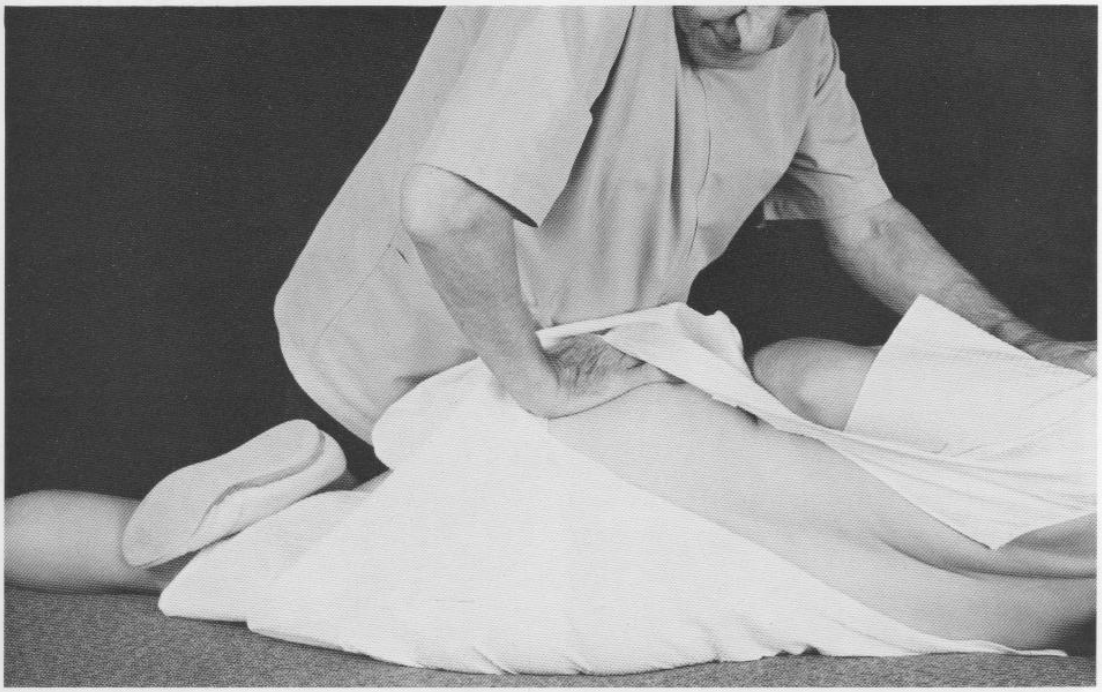


Figure 342: *Adjusting the In Ilium, push move.*

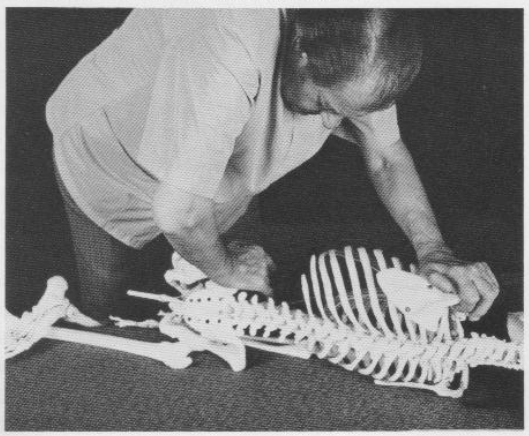


much the same way as he did with the pull moves. Instead of stabilizing the patient's pelvis with his leg on the patient's leg, however, stabilization is accomplished by the doctor lightly positioning his hip on top of the patient's hip (Fig. 340). He does not lean heavily on the patient's hip, nor will the patient's hip be supporting the weight of his body. The doctor must be balanced on both feet in order to assume this position without leaning heavily on the patient. Too much weight on the patient's pelvis will cause discomfort and loss of relaxation for both parties.

It should also be re-emphasized that when taking out the slack, the shoulder should not be pushed too far backwards (Fig. 341). This is a common occurrence, and should be avoided.

When taking out the slack with the contact hand, the tissues are pushed in the direction of the thrust (Fig. 342). The direction of thrust for the In ilium is directly lateralward, through the center of the sacroiliac joint. The thrust is given quickly, and with the depth controlled.

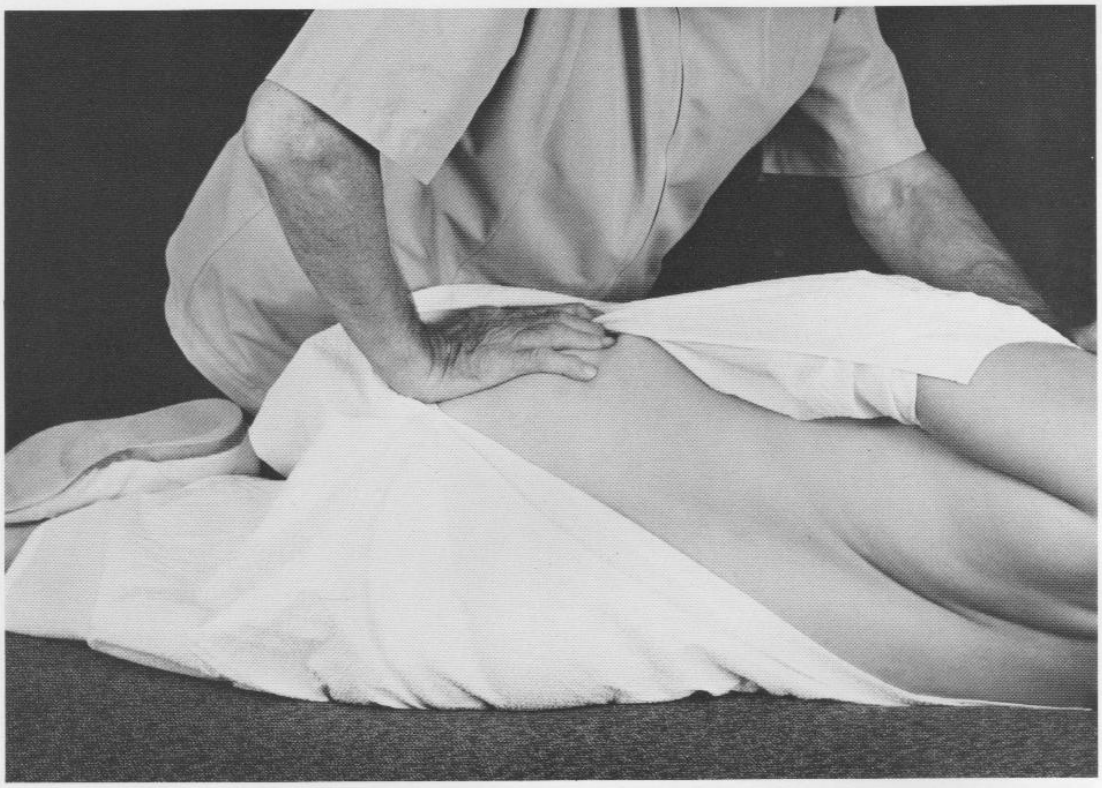
Figure 343: *Contact for a PIIn (push) Ilium.*



Adjusting the PIIn Ilium
Push Move

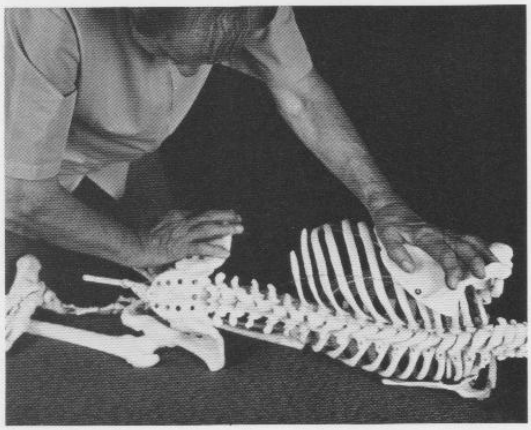
The preferred method of adjusting a PIIn ilium is with a push move. The contact point is the inferior-medial border of the PSS (Fig. 343). The doctor shifts his position inferiorward so that he may thrust superiorward and lateralward. The degree of superiority in the direction of the thrust will depend on the

Figure 344: *Adjusting the PIIn Ilium, push move.*



amount of PI relative to the amount of In, according to the listing. Figure 344 illustrates a listing similar to $PI_4 In_4$, which requires approximately forty-five degrees of superiority from a straight lateral thrust. Torque is applied to the contact point with the pisiform so that the PSS is rotated superiorward.

Figure 345: *Contact for an ASIn (push) Ilium.*



Adjusting the ASIn Ilium Push Move

The only effective method of adjusting an ASIn ilium is with a push move. The contact point is approximately two inches lateralward and three inches below the PSS on the back of the acetabulum (Fig. 345). It must be well above the ischial tuberosity. There is a tendency to want to contact lower on the ischium in order to increase the leverage. However, this contact is too far inferiorward, and produces binding within the sacroiliac articulation when it is used.

With the contact hand in position, the doctor places himself superiorward so that he may thrust inferiorward and lateralward (Fig. 346). At the same time as the thrust is executed, he torques the contact point with his pisiform in the direction that will rotate the PSS inferiorward.

External Push Moves

Ilium subluxations with Ex listings alone are not effectively adjusted with a push move. In fact, the only time it is really indicated to adjust an Ex ilium with a push move is when the Ex portion of the misalignment is minor relative to the other direction of misalignment. For example, a push move should be attempted on a PIEx when there is relatively little Ex misalignment, and more PI misalignment in the listing (e.g., $PI_8\,Ex_2$). Or, an ASEx should be adjusted with a push move only when the amount of AS greatly outweighs the Ex (e.g., $AS_6\,Ex_1$).

Adjusting the PIEx Ilium Push Move

The contact point is inferior and lateral of the PSS. The pisiform contact is used, and the direction of thrust is superiorward and medialward. The pisiform is torqued so that the PSS is rotated superiorward (Fig. 347).

Adjusting the ASEx Ilium Push Move

The contact point is at the back of the acetabulum, about two inches lateralward and three inches below the PSS. The doctor shifts his position superiorward so that he may thrust inferiorward and medialward. Torque is applied with a wrist action that rotates the PSS inferiorward (Fig. 348).

Some Very Important Points

It is important to realize that there should never be any thrust made with the stabilization hand. This hand should only apply light traction to the patient's shoulder. As the thrust is made with the contact hand, there is a tendency with most doctors to want to thrust simultaneously with the stabilization hand, creating a sissors-like action. This usually creates a painful, traumatic effect on the spine.

It should also be understood that there will almost always be an audible sound produced when an

Figure 346: *Adjusting the ASIn Ilium, push move.*

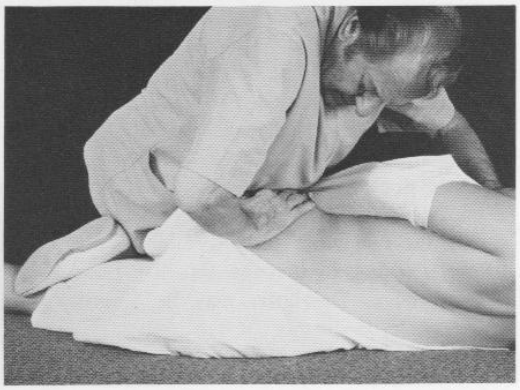


Figure 347: *Adjusting the PIEx Ilium, push move.*

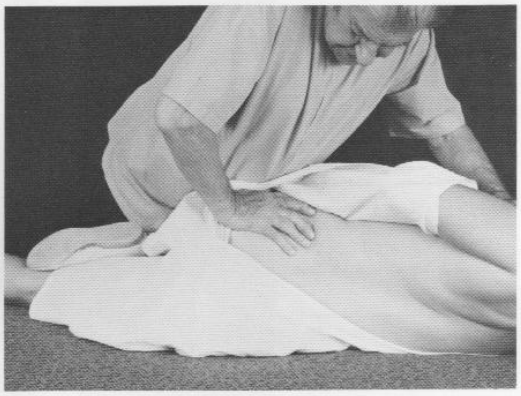
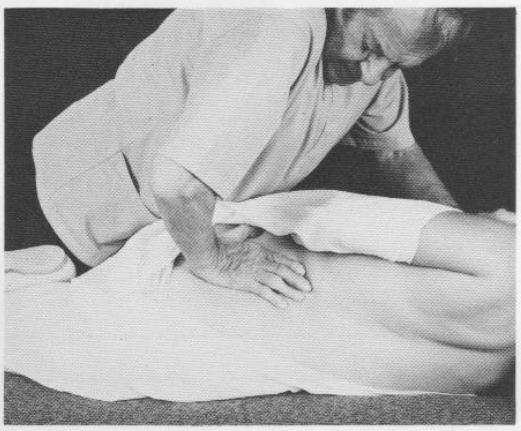


Figure 348: *Adjusting the ASEx Ilium, push move.*



effective, corrective adjustment is made. This should be evident to both the doctor and the patient. On very rare occasions, the doctor or patient, or possibly both, will not detect the movement. For instance, the subluxation will sometimes be reduced only after taking out the slack, and before any thrust is made. Oftentimes, the patient will not feel or hear this movement.

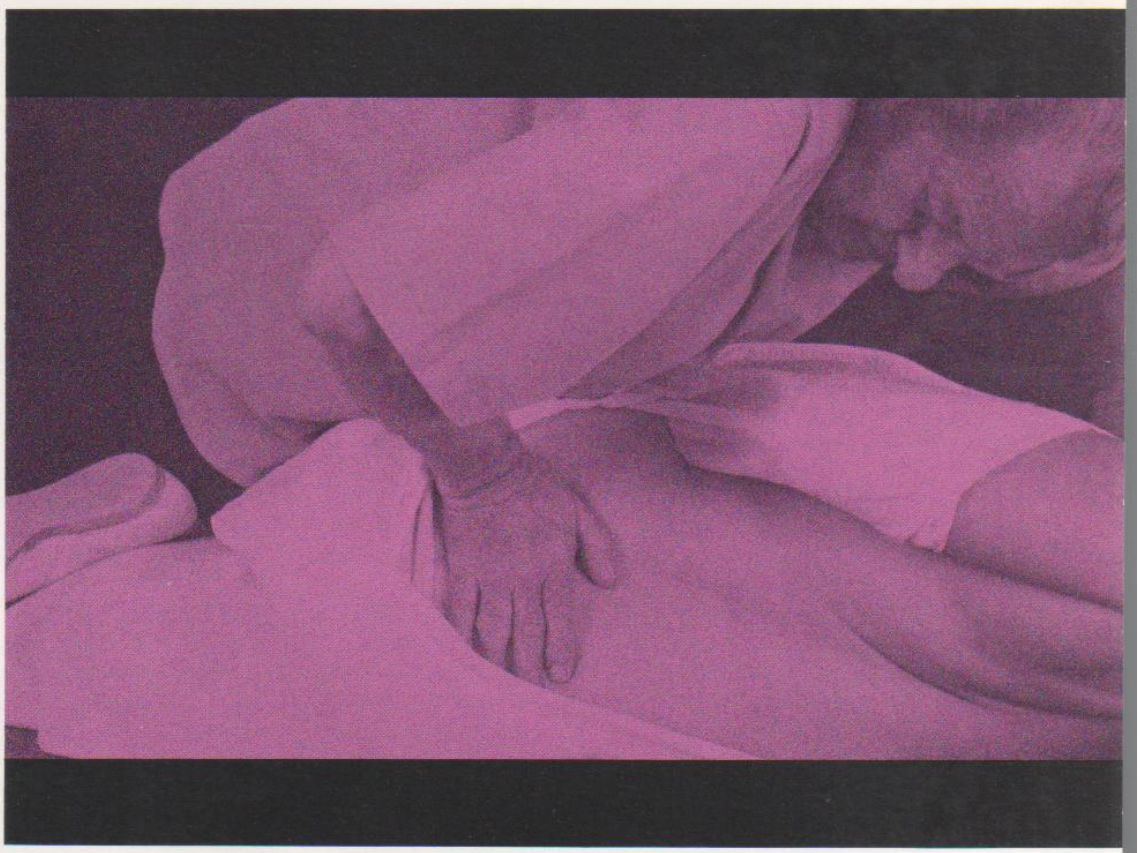
If the doctor is not able to move an ilium, and he is confident that he is using the correct direction of thrust, the two most likely possibilities are that the listing is wrong, or that the patient is tense and not able to relax. The latter may be because of the pain he is experiencing from the condition itself, or because the doctor is producing pain from taking out too much slack. On the other hand it is possible that the patient is tensing because he is fearful of being hurt by the doctor. All of these variables must be considered and rectified when it is possible to do so. Apprehension on the part of the patient because of past experiences or inordinate fears will require great perserverence by the doctor in order to gain his confidence.

The points in these last three paragraphs pertain not only to making ilium adjustments, but are equally applicable wherever the adjustments are made.

Notes

Sacrum Corrections

Chapter 14



Gonstead Chiropractic Science & Healing Art

Chapter 14

Sacrum Corrections

There are two basic kinds of sacral subluxations. One type is when the sacrum rotates posteriorward at one of the sacroiliac articulations. This is referred to as Posterior Rotation on the Right, or Posterior Rotation on the Left, depending on which side the sacrum rotates. In addition to posterior rotation, the sacrum may also misalign inferiorward on the same side.

The other basic type involves the lumbosacral joint. This is when the base of the sacrum misaligns posterior to the fifth lumbar, and is designated as a Posterior Sacral Base.

Posterior rotations of the sacrum produce inflammation at the sacroiliac joint. Instrumentation findings will be indicative, but confirmation must be made by palpating for tenderness, edema, and restricted motion. Such findings will indicate sacroiliac involvement, but will not differentiate between a posterior rotated sacrum, or an ilium misalignment. In either case, the symptoms and objective findings will be the same since it is the same articulation and the same nerves which are producing them. Whether to adjust the sacrum or the ilium must be decided by the x-ray findings. The rule, stated briefly, is that the sacrum is adjusted when the amount of rotation is considerably greater than the amount of ilium misalignment, and only when the ilium is misaligned predominantly AS or In. For a complete review of the rules explaining when the sacrum should be adjusted in preference to the ilium, and vice versa, the reader is referred to chapter four, page 43.

Posterior sacral base causes involvement of the lumbosacral nerve. The nerve is compressed due to protrusion of the lumbosacral disc. Fifth lumbar subluxation, which involves the same lumbosacral disc and nerve, will produce the same objective findings and symptoms as a posterior sacral base. As before, the x-ray must be used to determine which to adjust. In this instance, the lateral film is used to show whether it is the sacrum or the fifth lumbar that has misaligned posteriorward. In fact, this is one of the most important uses of the lateral radiograph, for if the wrong segment is "adjusted," the posterior misalignment will be increased, and the condition will immediately become worse.

Posterior sacral base is often confused with spondylolisthesis of the fifth lumbar vertebra. When all of the lumbar bodies are in line, and the body of the sacrum is clearly posterior to the lumbar bodies, a posterior sacral base exists. On the other hand, it may be seen that while the body of the sacrum is behind that of the fifth lumbar, the other lumbar bodies are also posterior to that of the fifth lumbar. This is usually due to spondylolisthesis of the fifth lumbar, where the body actually slips anteriorward due to a defect in the vertebral arch. In either case, the corrective procedure will be the same. The posteriority of

the sacrum must be reduced by adjusting the sacral base anteriorward. This will remove the structural stress from the lumbosacral disc, thereby eliminating the disc protrusion and resulting nerve compression. The reader is again referred to chapter four for a detailed review of posterior sacral base and spondylolisthesis.

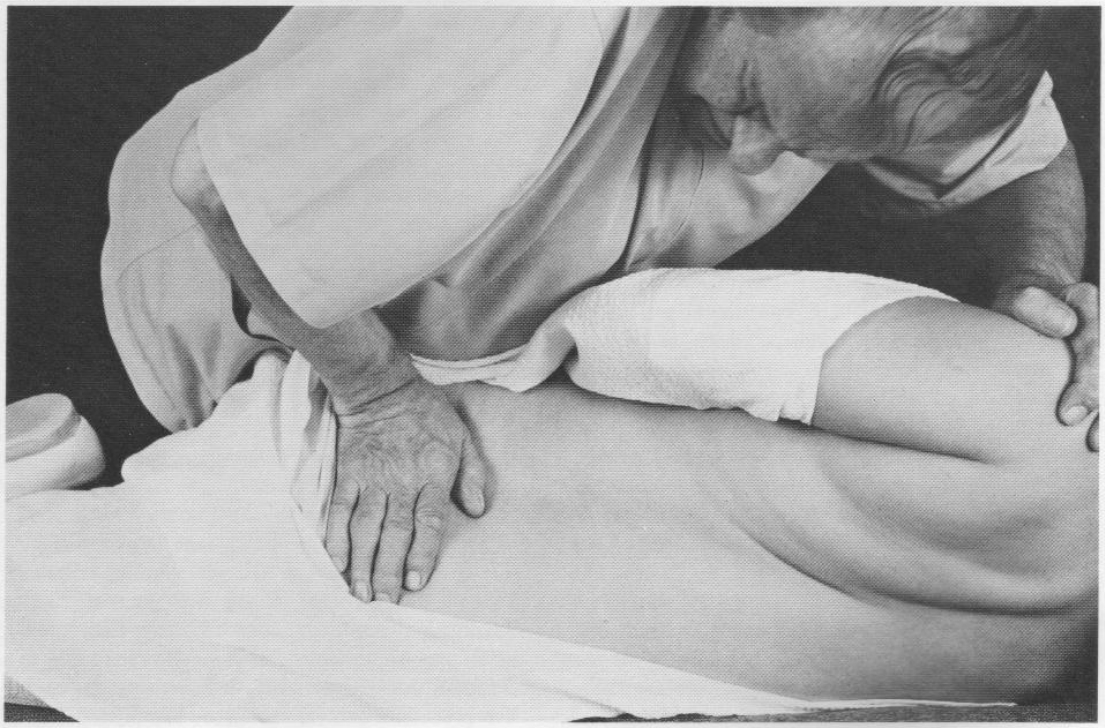
Sacrum Corrections at The Sacroiliac Articulation

Adjusting Posterior Rotation of the Sacrum

Posterior rotation of the sacrum includes the following listings: Posterior on the Left (P-L), Posterior on the Right (P-R), Posterior Inferior on the Left (PI-L), and Posterior Inferior on the Right (PI-R). The corrections are made on the pelvic table with the patient placed in precisely the same position as for ilium adjustments. The positioning errors to be avoided when adjusting the ilia apply to the sacrum as well.

The patient is most often placed with the involved side up. That is, with P-L and PI-L listings, the patient will lie on his right side.Having the involved side up generally provides better expansion or separation of the sacroiliac joint when the thrust is given, thereby allowing the sacrum to move easier and deeper. When the patient is placed with the involved side down, the expansion of the sacroiliac joint is somewhat restricted by the pelvic table. However, when adjusting heavy patients, placing the patient with the involved side down will often allow the doctor to use the patient's weight to advantage. There may be times when adjusting the patient with the involved side up does not seem to produce an adequate or complete correction. This may be due to numerous causes, such as the patient not being able to "let go" because of pain in that position. In such instances, the doctor should not hesitate to place the patient on the opposite side to adjust him with the involved side down.

Figure 349: *Contact for Posterior on Left or Posterior Inferior on Left sacrum.*



In figure 349 the patient is placed with the involved side up. She is lying on her right side, which indicates that the sacrum listing is either Posterior on Left (P-L), or Posterior Inferior on Left (PI-L). The doctor's contact hand will be his right hand, and he will stabilize the patient's left shoulder with his left hand. The contact point will be on the sacrum directly medial to the posterior superior spine of the left ilium. A more definitive description of the contact point would place it midway between the superior and inferior boundaries of the sacroiliac joint, about one half inch medialward to the PSS.

The doctor locates the contact point by first palpating the PSS of the involved side with his left (stabilization) hand. He then places the tips of his second, third and fourth fingers on the medial border of the PSS. The pisiform bone of his contact hand is then placed just medial to his finger tips (Fig. 350). In this way the doctor is assured of having his pisiform placed on the sacrum instead of on the ilium. This also allows his pisiform to be as close to the ilium as possible without actually contacting it. The contact hand is situated so that the fingers extend downward toward the opposite ilium.

The doctor then places his stabilization hand on the patient's shoulder so that moderate traction can be applied to the patient's spine by gradually pressing the shoulder superiorward and backwards. At the same time, the patient's pelvis is stabilized against the doctor's hip with the contact hand. The doctor leans quite far over the patient so that the forearm of his thrusting hand is nearly horizontal. This enables the direction of thrust to be applied through the sacroiliac articulation so that the left ala of the sacrum is rotated anteriorward. In addition to anteriorward, the direction of thrust is also directed slightly lateralward, corresponding to the plane of the ilium through the sacroiliac joint. The adjustment should be made through the doctor's pisiform bone with a relatively deep and very quickly applied thrust. Figure 351 illustrates the proper setup of the doctor and patient for a Posterior on Left (P-L) sacrum adjustment. If the sacral misalignment includes inferiority in the listing (PI-L), a rotational movement, or torque, is applied through the pisiform in such a way that the left side of the sacrum is rotated superiorward in relation to the ilium. In the case of Posterior Inferior on Left, as illustrated in figure 351, the inferiority would

Figure 350: *The pisiform is placed just medial to the finger tips.*

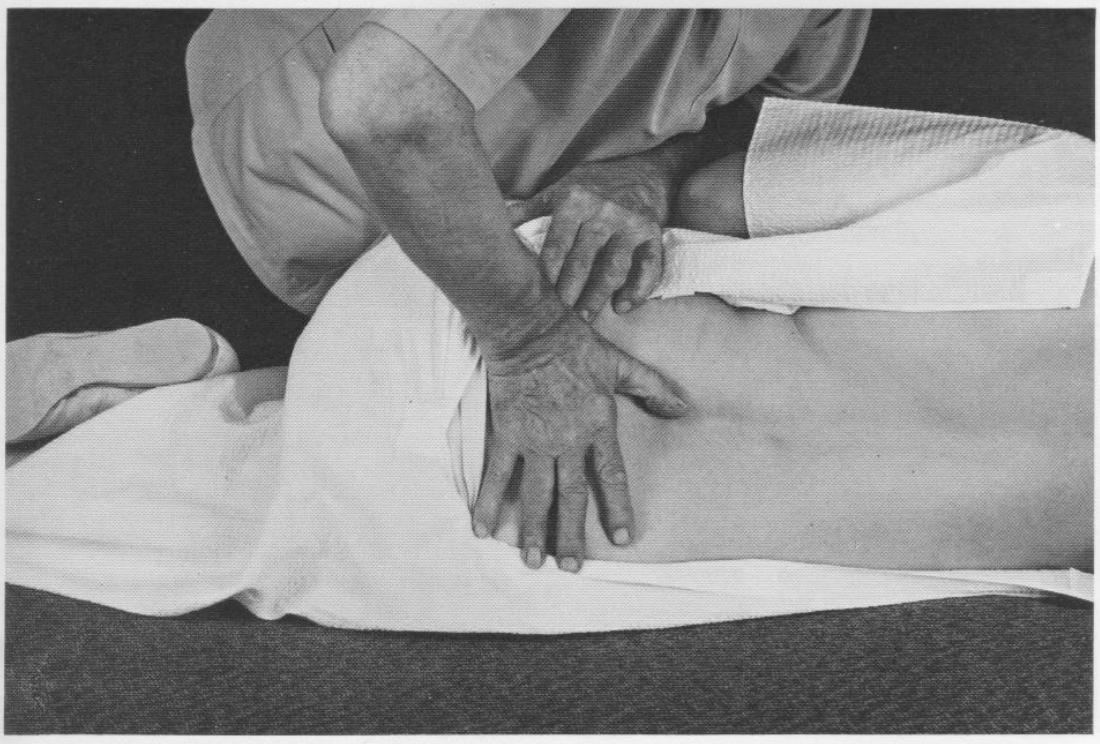
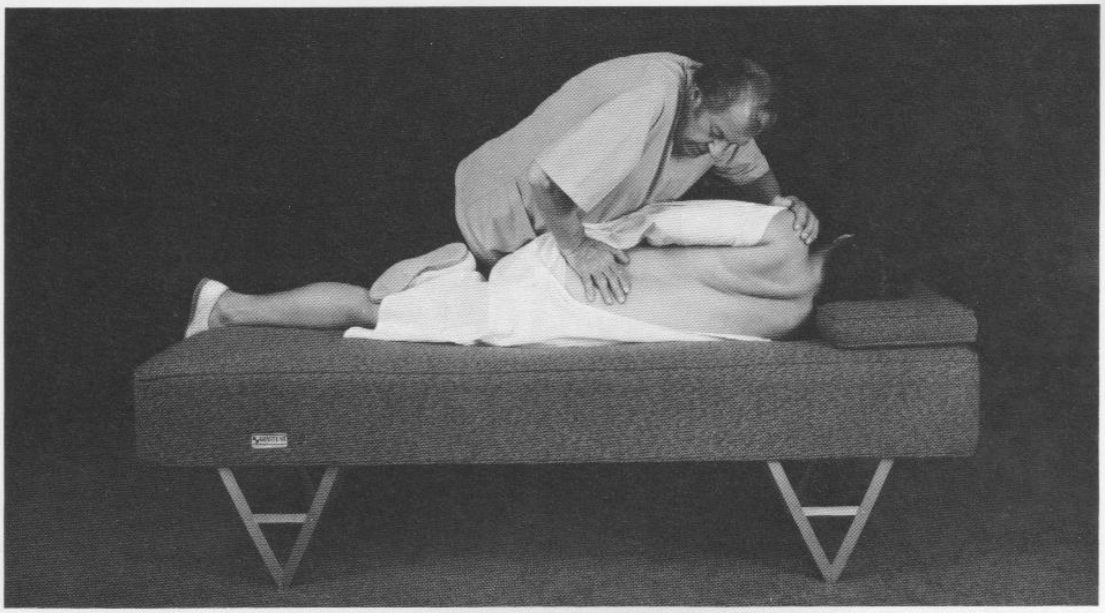


Figure 351: *Adjusting the Posterior on Left sacrum.*



be corrected by rotating the pisiform in a *clockwise* direction. This would rotate the left side of the sacrum superiorward. Rotation in the opposite direction, or *counterclockwise* torque of the pisiform, should be used to correct the inferiority of a Posterior Inferior on Right (PI-R) sacrum. For this listing the patient should be placed with the left side down (not shown).

When it is deemed necessary or advantageous to adjust a posterior rotated sacrum with the involved side down, as was mentioned previously, the doctor-patient setup remains basically the same. The only significant difference is in the position of the doctor's contact hand. Although the contact *point* remains the same, the hand is placed so that the fingers are pointing superiorward and slightly lateralward. This allows the pisiform to be placed on the contact point without any possibility of force being applied to the adjacent ilium by the extending fingers.

Figure 352 shows the placement of the contact hand on a skeletal specimen. The specimen is positioned for correcting a Posterior on Right (P-R), or Posterior Inferior on Right (PI-R) sacrum, with the involved side down. The direction of thrust is through the plane of the sacroiliac joint so that the posterior ala is rotated anteriorward and lateralward. The thrust is administered quickly and deeply, just as it is when adjusting with the involved side up. As well, torque is used to correct inferiority. When the listing is PI-R, and is being adjusted with the involved side down, as shown in figure 352, a counterclockwise torque of the pisiform is given. If the listing is Posterior Inferior on Left, and is being adjusted with the involved side down, then a clockwise torque is used.

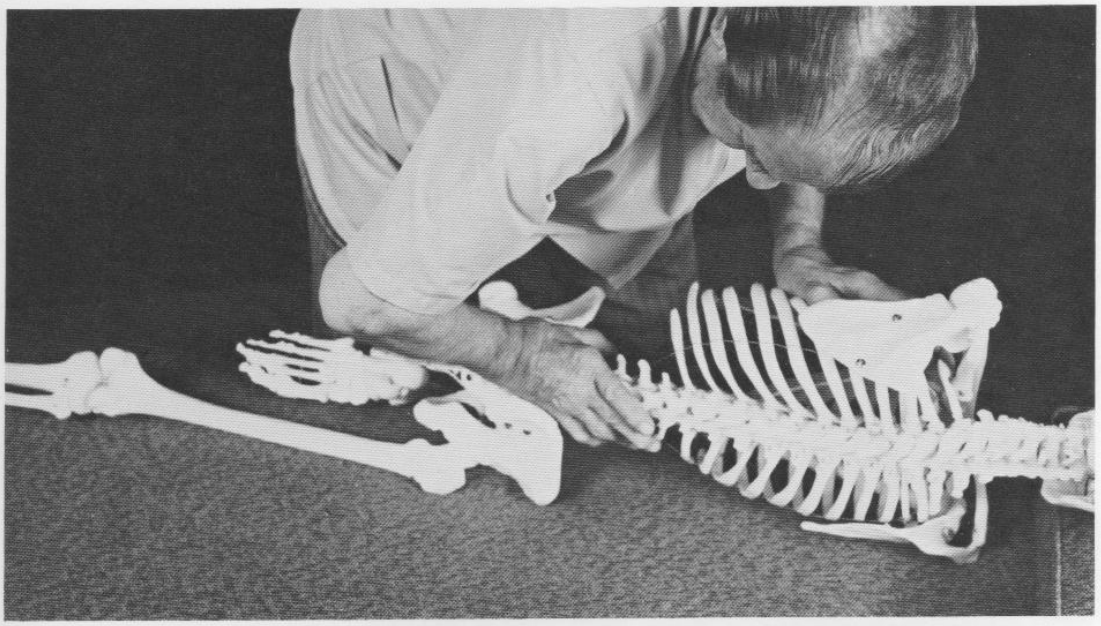
Instead of trying to memorize whether the torque should be clockwise or counterclockwise for any given listing, it is far better to visualize the direction the wrist must be rotated in order to adjust the inferior side of the sacrum superiorward, and then thrust accordingly.

Sacrum Corrections at The Lumbosacral Articulation

Adjusting Posteriority of the Sacral Base On the Pelvic Table

When the posterior sacral base is adjusted, the body of the first sacral segment is aligned with the

Figure 352: *Placement of contact hand for Posterior on Right, involved side down.*



body of the fifth lumbar vertebra. The entire correction occurs at the lumbosacral joint. When the sacrum is adjusted anteriorward toward the fifth lumbar body, both ilia move with it. Thus, the pelvis moves forward as a single unit, and no movement of the sacrum occurs at the sacroiliac joints.

The direction of misalignment in a posterior sacral base consists entirely of posteriority. There is no rotation or lateral wedging to be considered. Therefore, the patient may be adjusted with either side down. The doctor should place the patient according to which hand he feels he can deliver the most effective adjustment, that is, the hand with the quickest and most accurate thrust. The only other consideration will be how the sacrum moves after it is adjusted a few times. If the doctor believes he is not getting an adequate reduction in spite of a good thrust, he may want to try the opposite side.

The patient is positioned on the pelvic table in the same manner as for the other pelvic adjustments. If the patient is lying on his right side, the doctor uses his right hand for the contact hand, and his left hand for the stabilization hand. The contact point is the *first sacral tubercle*. Since the corrective movement occurs through the lumbosacral disc, the contact point must be as close to the disc as possible. In the case of a malformed or nonexistent tubercle, the contact point should still be high on the sacrum where the tubercle normally would be. It is not necessary that the tubercle be a large, bony prominence.

The contact hand is placed so that the pisiform is over the contact point, with the fingers pointing at approximately a forty-five degree angle from the longitudinal axis of the spine (Fig. 353). Before thrusting, the doctor rolls the patient slightly forward with his contact hand, until the patient's pelvis is stabilized against his hip. The stabilization hand applies moderate traction to the shoulder so that the excessive slack in the spinal tissues is reduced.

Figure 353: *Contact for posterior sacral base.*

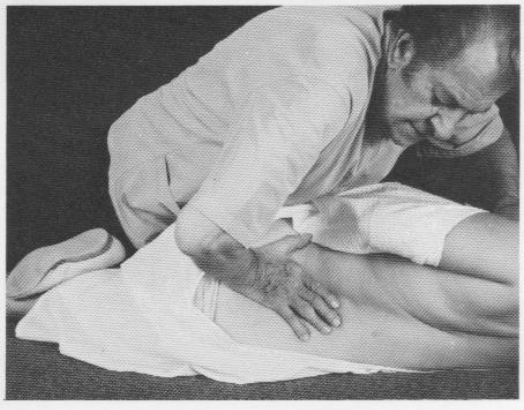
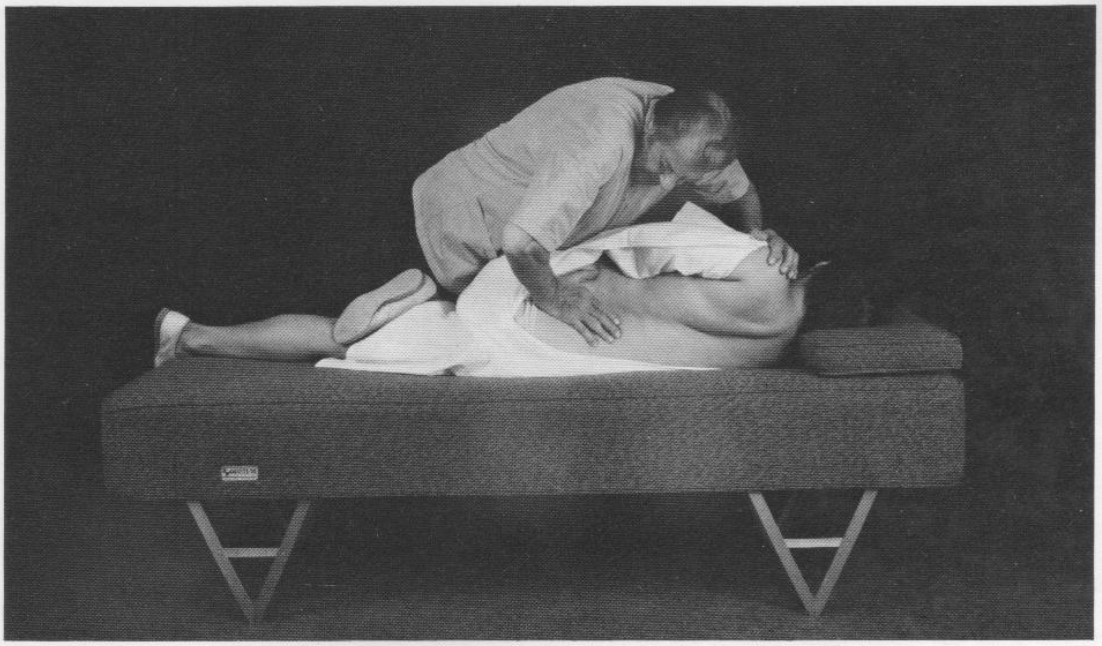


Figure 354: *Adjusting the posterior sacral base.*



The direction of the thrust is through the posterior to anterior plane line of the lumbosacral articulation. In other words, it is directed anteriorward, through the lumbosacral disc. The thrust must be relatively forceful and very quick. In fact, a great amount of pivotal writst action is required in the thrust in order to generate sufficient force and speed to overcome the inertia of the pelvis.

Figure 354 illustrates the proper doctor-patient setup for a posterior sacral base.

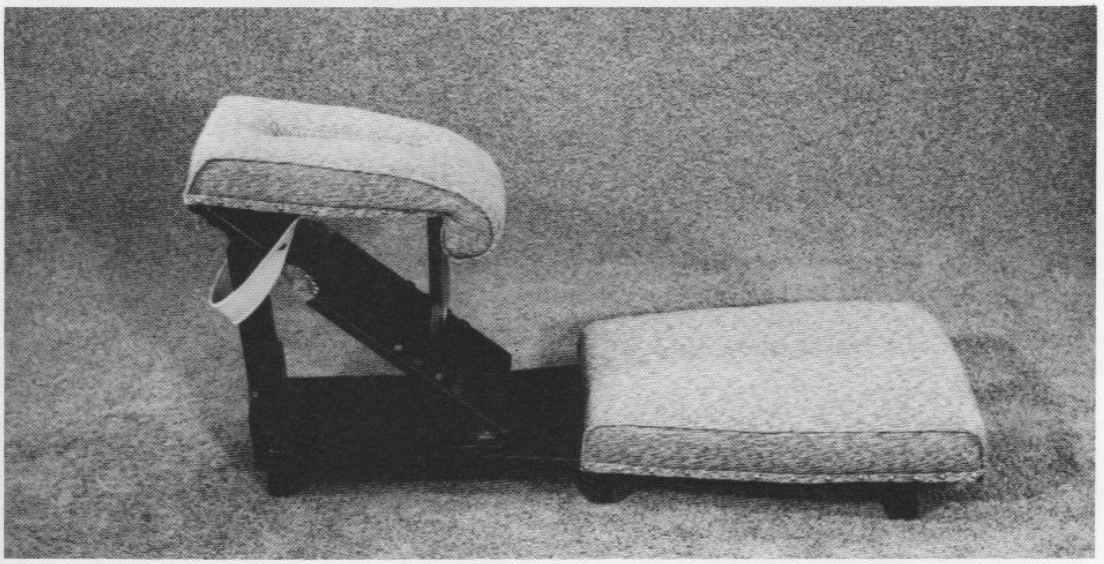
The Gonstead Knee-Chest Table

The knee-chest table provides an effective method for adjusting all segments of the spine, from the sacrum to the atlas. The table consists of a lower platform for supporting the patient's weight in the kneeling position. The platform is cushioned with double density foam rubber to prevent "bottoming out," and to permit a rebound action in direct proportion to the amount of thrust used. In addition, the table has a slotted chest support section which is adjustable to accommodate patients of all sizes. The chest support section is also adjustable to allow the various angles of inclination that are needed when adjusting different areas of the spine.

When the knee-chest table is used correctly, considerably less force is required to move a segment than is permitted by other positions because of the following two reasons: (1) The knee-chest position allows maximum relaxation of the spinal muscles which, when contracted, would otherwise restrict posterior to anterior movement of the segment being adjusted. (2) The knee-chest position permits unrestricted anterior expansion of the spine, since there is no support under the patient, as with other tables.

However, it is imperative that the patient be positioned correctly, that is, so he can totally relax, in order to utilize the advantages of the knee-chest table. All too often, the patient is positioned incorrectly so that he is off balance, uncomfortable, and tense. Consequently, more instead of less thrust is required to adjust the segment, and the thrust produces pain. This begins the familiar vicious cycle of anticipated pain producing more tension, requiring a harder thrust, followed by more pain, causing more tension, etc. If the knee-chest table is anathema to the patient, and he resists being adjusted on it, then the doctor's technique is most assuredly at fault.

Figure 355: *The Gonstead knee-chest table.*



Getting On and Off The Knee-Chest Table

The doctor should instruct the patient on the proper procedure for getting on and off the knee-chest table. If the patient is in pain, particularly with a low back condition, the proper method of getting on the table will minimize his discomfort by avoiding any twisting and stretching of the lower spine. In addition, after an adjustment is made, getting off the table properly will lessen the likelihood of resubluxating the segment.

The patient should first place one foot forward and to the side of the lower platform, as shown in figure 356. He should then kneel on the opposite knee as illustrated in figure 357. Then, before reaching for the chest support, he should bring the other

Figure 356

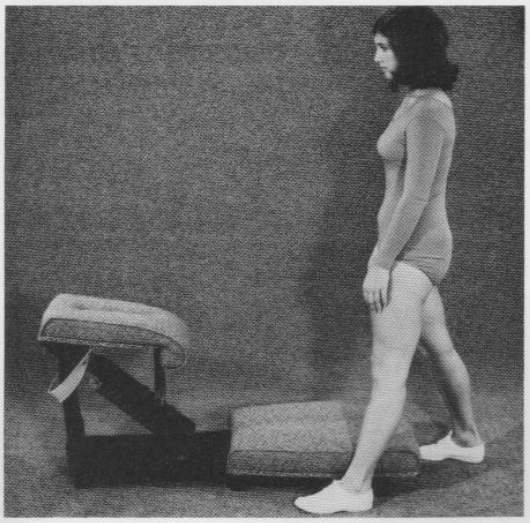


Figure 357

Figure 358

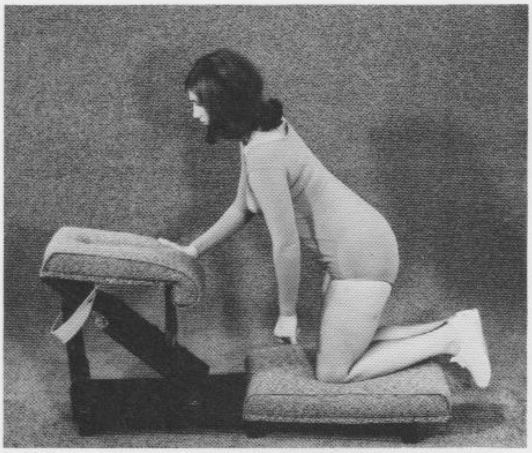
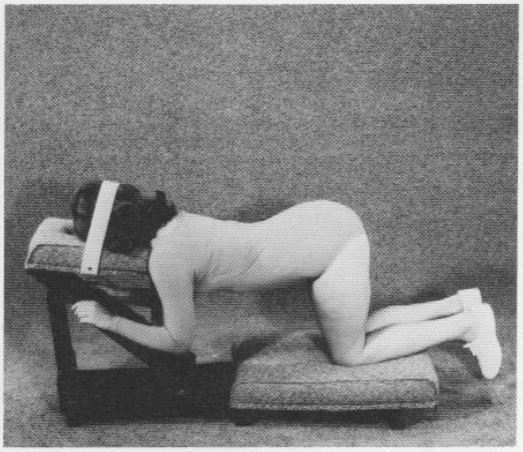


Figure 359



knee into the kneeling position. After he is balanced on both knees, he should grasp the chest support with either hand (Fig. 358), and bring his head and chest down on the slotted support. Finally, the patient assumes the position shown in figure 359, where the abdominal muscles have relaxed to allow the maximum amount of lumbar lordosis.

When getting off the knee-chest table, the procedure should be followed in reverse order. The patient should first push himself away from the chest support, and balance himself on both knees. Then one foot should be placed forward and to the side of the lower platform. Finally, using the leg that is forward, he should push himself up into the standing position, and back away from the table.

Adjusting Posteriority of the Sacral Base On the Knee-Chest Table

Figure 360 shows the patient in position for adjustment of a posterior sacral base. The chest support is almost flat, or on a minimal incline. The height of the chest support is positioned so that the patient's chest is level with, or slightly lower than, the pelvis. The chin is placed about two inches above the bottom of the slot, so there is ample room for breathing, and no choking sensation.

The knees are positioned so that the patient feels completely relaxed. After the face and chest are

Figure 360: *The patient in position for a posterior sacral base.*

placed correctly on the chest support, the position of the knees should be adjusted so that the weight is balanced equally on both knees, and evenly distributed between the knees and chest. This usually places both femurs at about a fifteen degree angle from the perpendicular, but may be more or less, depending on the patient's sacral angle and lumbar lordosis.

Attached to the chest support will be found a stabilization strap for securing the head. Its use prevents hyperextension of the neck when the adjustment is made, and it should be used for all knee-chest table adjustments. Before attaching the strap, the back of the patient's head should be rotated an inch or two to the left (Fig. 361). Then, as the strap is pulled to the right and fastened to the velcro fastener, the head rotation is eliminated. If this is not done, the head will be rotated to the right after the stabilization strap is secured. The strap should not be so tight that it causes discomfort to the patient's face.

Below, and on either side of the chest support, is a padded place for the patient's hands. These are positioned so that the patient will not be supporting his weight with his hands, and so that the arms and shoulders will be relaxed (Fig. 362). This effect should not be nullified by allowing the hands to be placed under the chest support, or on the floor.

Figure 361: *The head is first rotated to the left before the strap is fastened.*

When adjusting a posterior sacral base on the knee-chest table, the doctor may stand on either side of the patient. If he stands on the right side of the patient, he will use his left hand as the contact hand. His right hand will be the contact hand if he stands on the left side of the patient.

Figure 362: *The hands should be positioned correctly so the shoulders and arms are relaxed.*

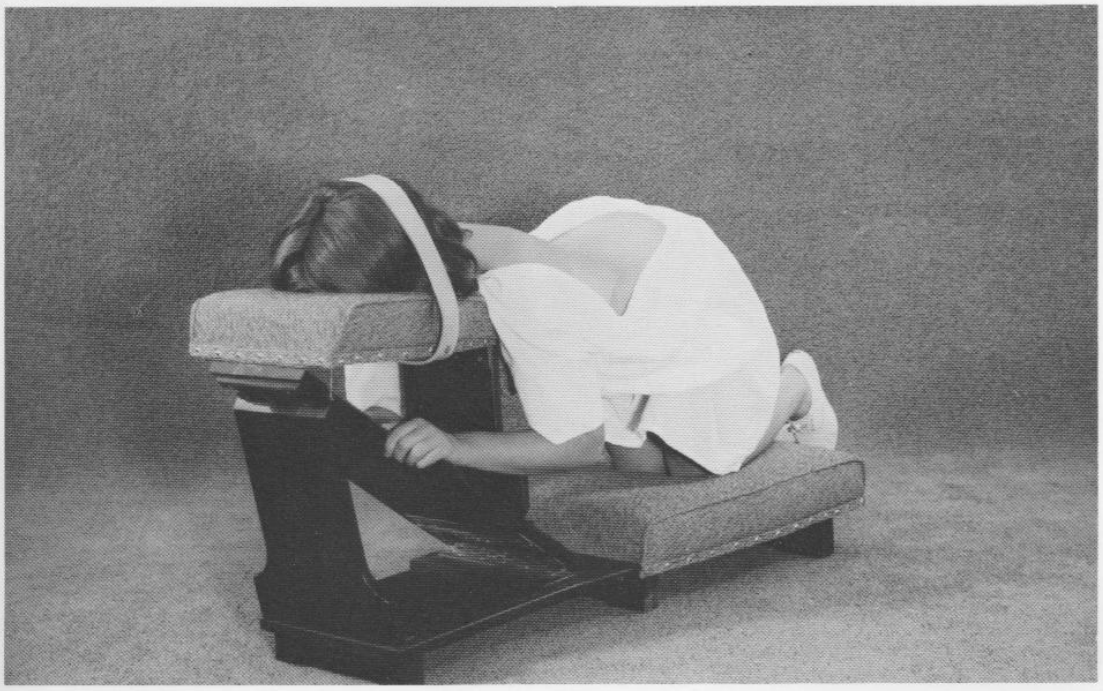


Figure 363: *The doctor faces the patient at a ninety degree angle.*

The doctor should face the patient at a ninety degree angle as shown in figure 363. He should be standing close enough to the patient so that when he is leaning forward with his contact hand in position, he will not be off balance. His weight should be evenly distributed on both feet. The contact hand should be placed so that the pisiform is over the first sacral tubercle, with the fingers directed toward the patient's head, and at approximately a forty-five degree angle from the longitudinal axis of the spine.

If the muscular contours of the patient's spine do not allow comfortable placement of the contact hand at a forty-five degree angle, then a lesser angle, with the fingers directed more toward the patient's head, should be selected (Fig. 364). The main objective is to "fit" the contact hand into position so that the palm and fingers feel comfortable and relaxed while the pisiform is on the first sacral tubercle. If the muscles of the hand are contracted, the effectiveness of the thrust will be lost. This obviously disqualifies the use of a "high arch," since the hand cannot be arched, nor can the wrist be flexed, with the muscles of the hand completely relaxed.

The stabilization hand is placed around the wrist of the contact hand as shown in figure 364. The wrist is not grasped by the fingers of the stabilization hand, since this would contract the muscles in the stabilization hand as well. Instead, the stabilization hand is lightly placed on top of the contact hand, with the fingers relaxed and lightly wrapped around the wrist.

The excessive slack in the spinal tissues is then reduced by applying light pressure through the contact point *with both the contact hand and the stabilization hand*. The pressure to reduce the slack is applied in the direction in which the thrust will be

Figure 364: *The contact and stabilization hands in position for a posterior sacral base.*

made, that is, through the plane line of the lumbosacral articulation (through the lumbosacral disc), in the posterior to anterior direction. This pressure must be very light, for otherwise the patient will resist it by contracting his muscles.

The thrust is given in a posterior to anterior direction, quickly, and with controlled depth (Fig. 365). It is executed with equal force through both the contact hand and the stabilization hand, even though it is applied through the pisiform of the contact hand. As

Figure 365: *Adjusting the posterior sacral base.*

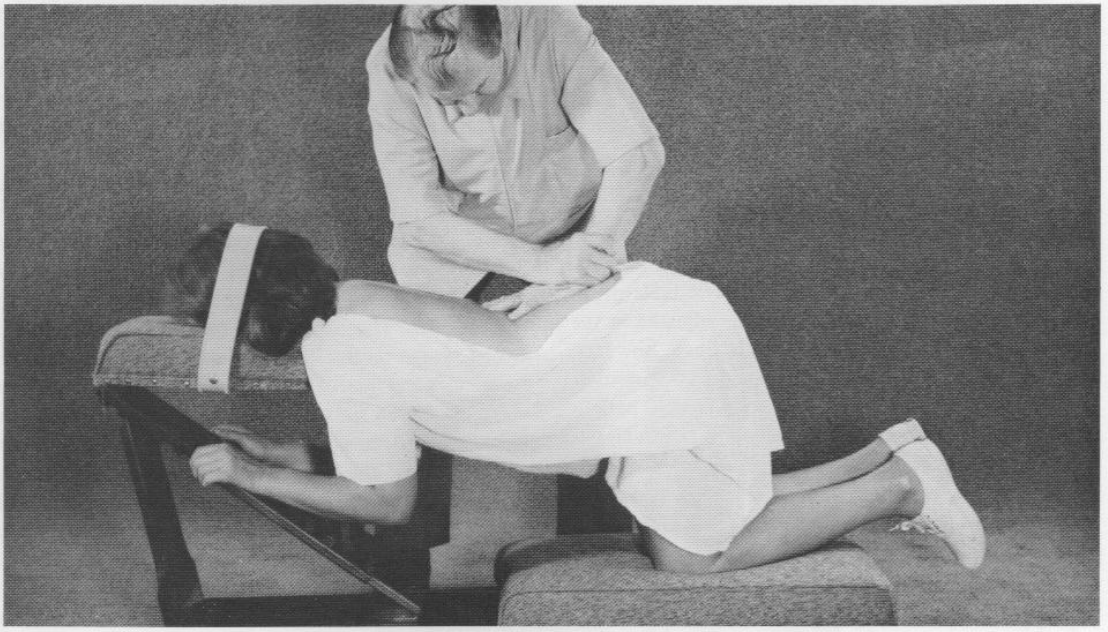
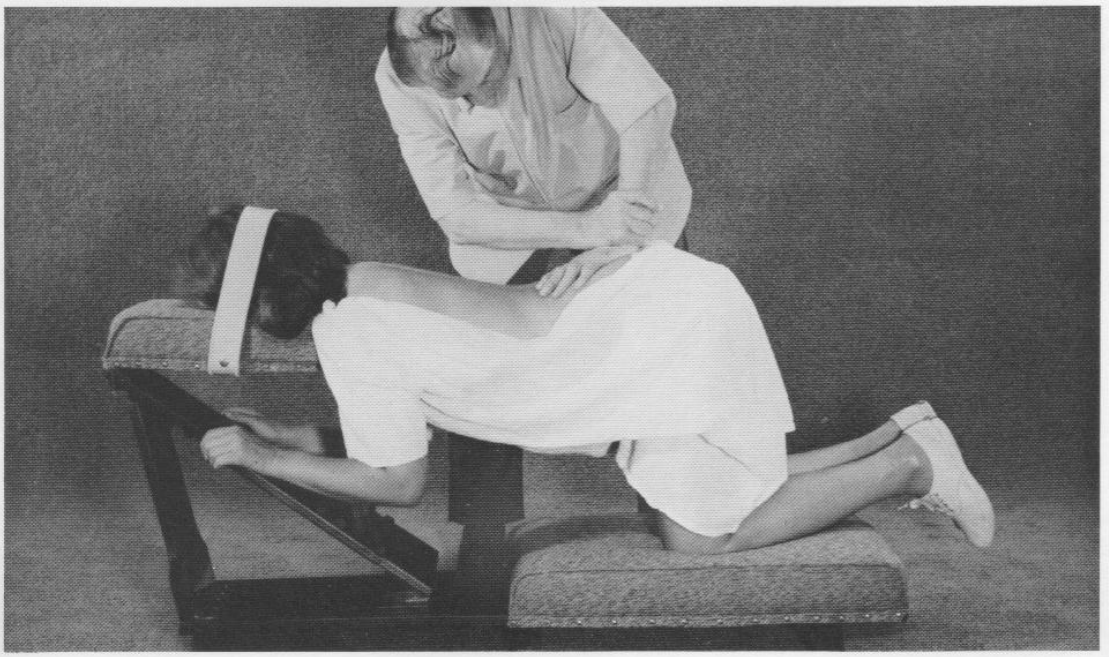


Figure 366: *Adjusting the posterior sacral base with increased lumbar lordosis.*



the thrust is made, the entire upper portion of the doctor's body moves, not just his arms.

Figure 366 also shows a patient-doctor setup for a base posterior sacrum. In this illustration, the direction of thrust has been modified to allow for increased lumbar lordosis. The direction of thrust must always be through the lumbosacral disc, that is, through the plane line of the lumbosacral joint.

Adjusting Posteriority of the Sacral Base In the Prone Position

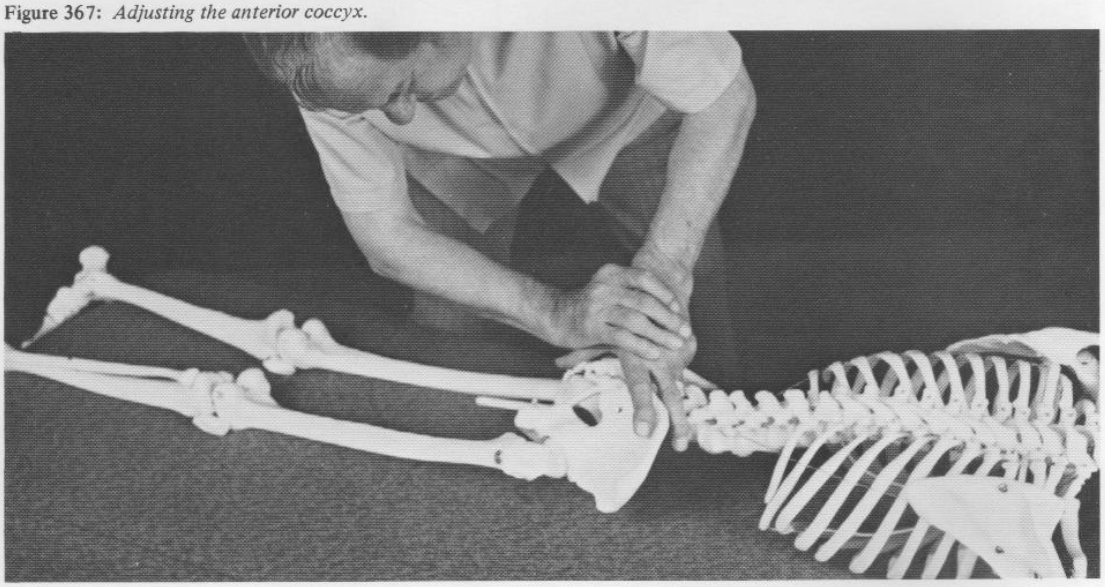
Although the preferred methods for adjusting a posterior sacral base are either on the pelvic table or on the knee-chest table, it may also be adjusted in the prone position. This is not normally done, however, because there is usually not enough expansion or "opening up" of the lumbosacral joint when a patient is fully supported on a table such as the Zenith Hi-Lo. But sometimes, as with paralyzed or extremely weakened patients, the other positions are not practical. All information regarding doctor-patient setup, contact hand placement, and direction of thrust remain the same.

Adjusting the Anterior Coccyx

The anterior coccyx is preferably adjusted with the patient on the Zenith Hi-Lo table in the prone position. The pelvic support on the table is elevated slightly, to make the coccyx more accessible. The doctor may stand on either side of the patient, except when lateral deviation exists (A-R or A-L), which is quite rare (see Chapter four, page 47). If laterality is present, the doctor should stand on the side of lateral deviation. If the doctor is standing on the patient's right side, he will use his right hand as the contact hand. Likewise, if he is on the patient's left side, the left hand will be the contact hand (Fig. 367).

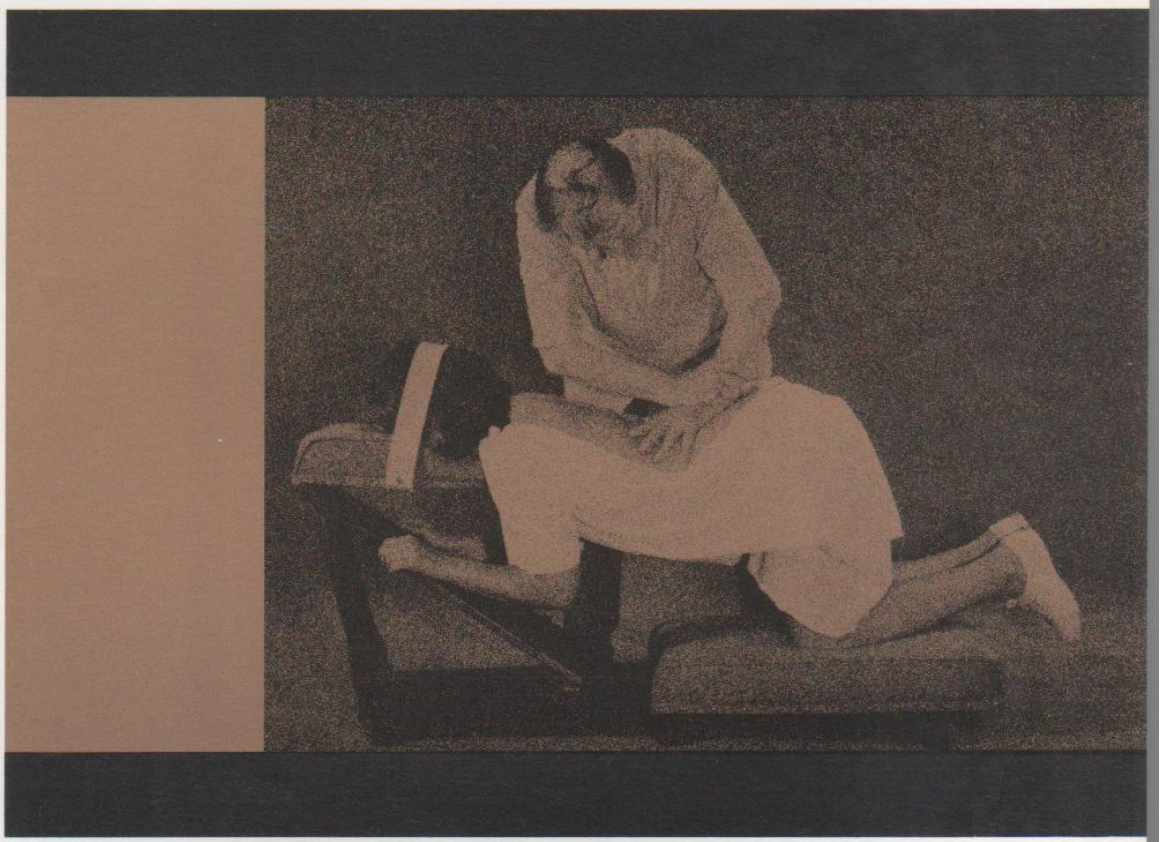
The coccyx is located below the apex of the sacrum by palpation with the thumb of the contact hand. The thumb is placed on the posterior surface of the coccyx so that the tip of the thumb is about one inch below the sacrococcygeal joint, as shown in figure 367. The pisiform of the stabilization hand is then placed on the thumb slightly below the metacarpophalangeal joint (Fig. 367). Very slight pressure is applied to the thumb by the stabilization hand in the posterior to anterior and inferior to superior directions. Then the tissues overlying the coccyx are stretched superiorward very gently with the thumb of the contact hand, until the slack is removed from them. A light thrust is then given through a combined motion of both the contact and stabilization hands, with the direction of thrust being superiorward. The anteriority of the coccyx is actually reduced through a leverage action which pulls the coccyx posteriorward when the tissues are stretched superiorward.

Figure 367: *Adjusting the anterior coccyx.*



Lumbar Corrections

Chapter 15



Gonstead Chiropractic Science & Healing Art

Chapter 15

Lumbar Corrections

Lumbar Adjustments on The Pelvic Table

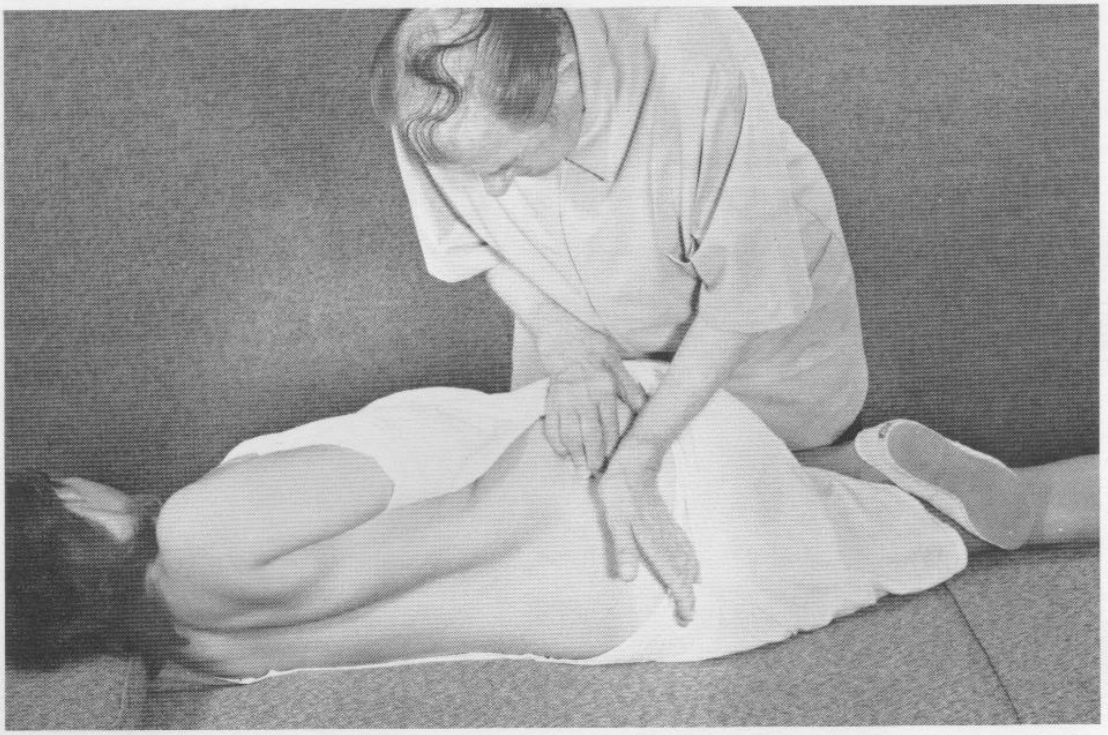
Push Moves

The lumbar vertebrae may be adjusted on the pelvic table with the patient placed in the side position. The very same position is used as when adjusting the sacrum or ilium. The push move is most effective when the patient has an adequate lordosis, and when a deep P to A move is desired to correct the subluxation. If the lordosis is minimal, due to excessive low lumbar rotation, then the pull move will probably be the method of choice.

The push move is primarily used for adjusting the fourth and fifth lumbars. However, with proper application and skill, the other lumbars may also be adjusted this way, although with increasing difficulty as the spine is ascended. This is because the facets of the higher lumbars are on more of a sagittal plane, and any twisting of the spine (as when pushing back the patient's shoulder to take out the slack) will have a locking effect.

Push moves are made with a pisiform contact. The location on the vertebra where the pisiform is placed, that is, the "contact point", will be either the spinous

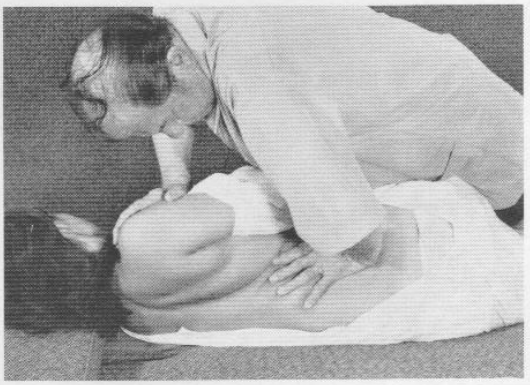
Figure 368: *Stabilization hand locating spinous process contact point.*



process or the mammillary process. The spinous process is the contact point for the following listings: P, PR-Sp, PL-Sp, PRS, PLS, PRS-Sp, PLS-Sp, PRI-Sp, and PLI-Sp. (For a review of the lumbar listings, consult the chart on page 73 of chapter six.)

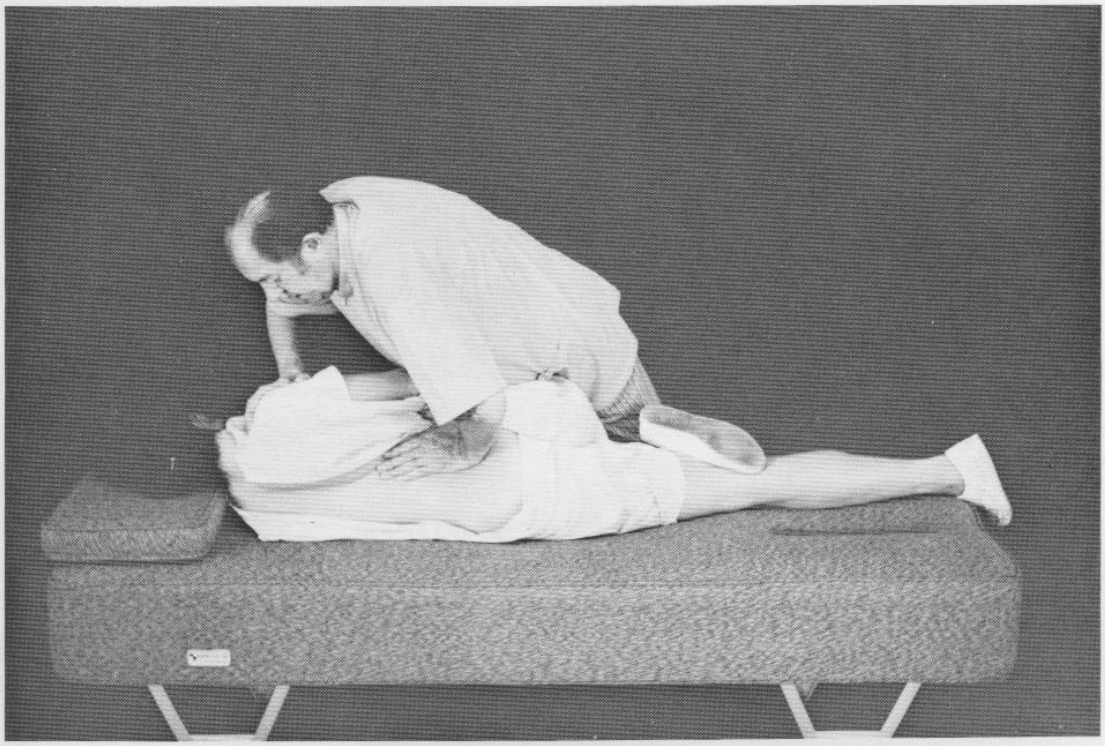
In spinous process contacts, the patient is placed with the side of body rotation *down*. In other words, the side of spinous laterality will be placed *up* so that the thrust on the spinous process will reduce spinous laterality. Figure 368 illustrates the patient placed with the left side down, the listing being a PRS-Sp of the fifth lumbar. The doctor's left hand will be the contact hand, while his right hand will be the stabilization hand. He first locates the contact point with his stabilization hand, as shown in the illustration. He then places the pisiform of his contact hand on the spinous process. The contact hand is placed so that the fingers cross the spine at about a forty-five degree angle. (Fig. 369). This is similar to the hand placement used when adjusting a base posterior sacrum. Once the contact hand is carefully placed, the doctor then places his stabilization hand on the patient's shoulder. With the contact hand, the doctor rolls the patient forward to about a forty-five degree

Figure 369: *Placement of the contact hand for a PRS spinous listing.*



angle, or less, so that the patient's pelvis is stabilized against his hip. The stabilization hand then reduces the slack in the spinal tissues by pushing the shoulder superiorward and slightly backward. The thrust is then made through the plane of the intervertebral disc. The direction of thrust is P to A, and, in the case of the listing shown (PRS-Sp), from right to left. Torque is also applied to reduce the lateral wedging.

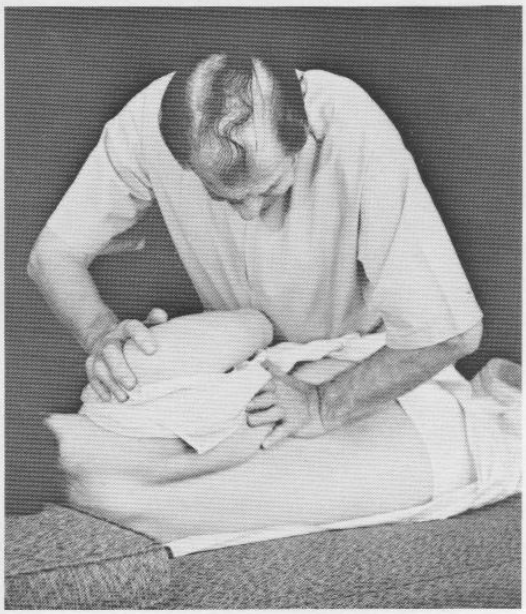
Figure 370: *The doctor-patient setup for a PRS spinous contact.*



In the listing shown, the torque will be clockwise. If the listing is a PRI-Sp, for example, the direction of torque will be counterclockwise. Figure 370 shows the doctor-patient setup, with the contact hand properly placed for PRS-Sp fifth lumbar correction.

The mammillary process is the contact point for the following listings: PRI-M, PLI-M, PR-M, PL-M, PRS-M, and PLS-M. In mammillary contacts, the patient is placed so that the side of body rotation is *up,* and the side of spinous laterality is *down.* The mammillary process on the side of body rotation is the contact point. Figure 371 illustrates the patient placed with the left side down, the listing being PLI-M of the fifth lumbar. The preliminary positioning of the patient is identical to that used for spinous contacts. The doctor will use his left hand for the contact hand, and his right hand for the stabilization hand. He first locates the mammillary process of the fifth lumbar with his stabilization hand, and then carefully places his pisiform of the left hand on the contact point. The fingers of his contact hand, instead of being on an angle to the longitudinal axis of the spine, will be parallel to it (Fig. 371). It is very important that the fingers are not placed across the

Figure 371: *Placement of the contact hand for a PL-M mammillary contact.*



spine, or over the spinous processes, as this would interfere with the direction and depth of the thrust. With the contact hand properly placed, the slack in the spinal tissues is reduced with the stabilization hand on the patient's shoulder in the usual manner.

Mammillary contacts will not require the patient's body to be rolled as far forward as when using a spinous contact. Instead, the doctor leans further over the patient, stabilizing his hip against the patient's pelvis. The forearm of his thrusting arm will be nearly parallel with the surface of the table (Fig. 372). This will allow a more P to A direction of thrust, thus reducing the body rotation with a deep thrust on the mammillary process. If lateral wedging is a component of the listing, torque will be applied accordingly. In the listing shown (PLI-M), the direction of torque will be counterclockwise in order to reduce the wedging of the disc. If the listing is PLS-M, which will be found in fifth lumbar subluxations only, the torque will be clockwise. Figure 372 shows the proper setup for a PLI-M or PLS-M fifth lumbar correction.

The differences in hand placement and direction of thrust between spinous and mammillary contacts should be clearly understood. In figure 373 the listing is a PRS-Sp, which requires a spinous contact. The fingers of the contact hand cross the spine at approximately a forty-five degree angle, and the position of the doctor's forearm clearly indicates the direction of thrust. Since the contact is made on the spinous process, the spinous will be moved from the right to the left, thereby correcting the spinous laterality. In comparison, figure 374 shows the fingers of the contact hand placed parallel to the spine, with the forearm positioned more parallel to the table, or perpendicular to the patient's spine. In the latter example the listing would be a PL-M, a PLI-M, or possibly a PLS-M fifth lumbar subluxation. The direction of thrust through the mammillary process will correct the body rotation by moving the mammillary P to A, while reducing left spinous laterality at the same time.

Figure 375 illustrates the position of the contact hand the doctor-patient setup for a PRS second lumbar subluxation. In figure 376 the hand placement and doctor-patient set-up illustrates a second lumbar PL-M or PLI-M listing.

Figure 372: *The doctor-patient setup for a PL-M mamillary contact.*

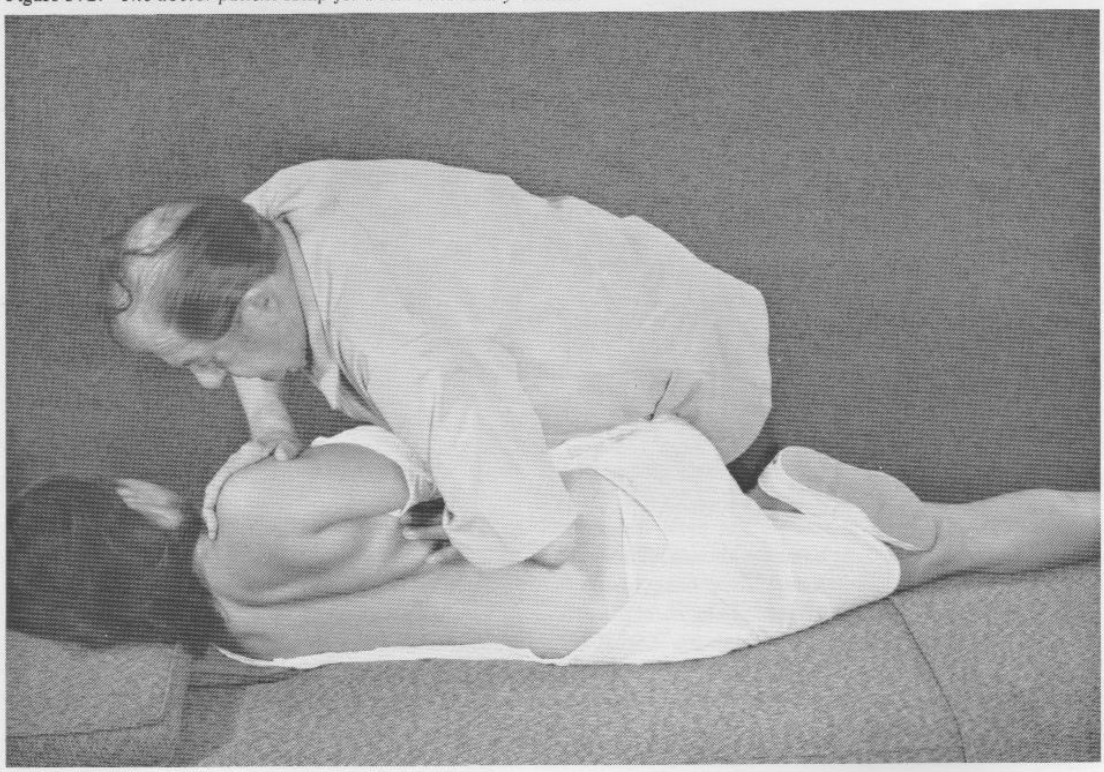


Figure 373: *Proper hand and arm positioning for a PR spinous contact.*

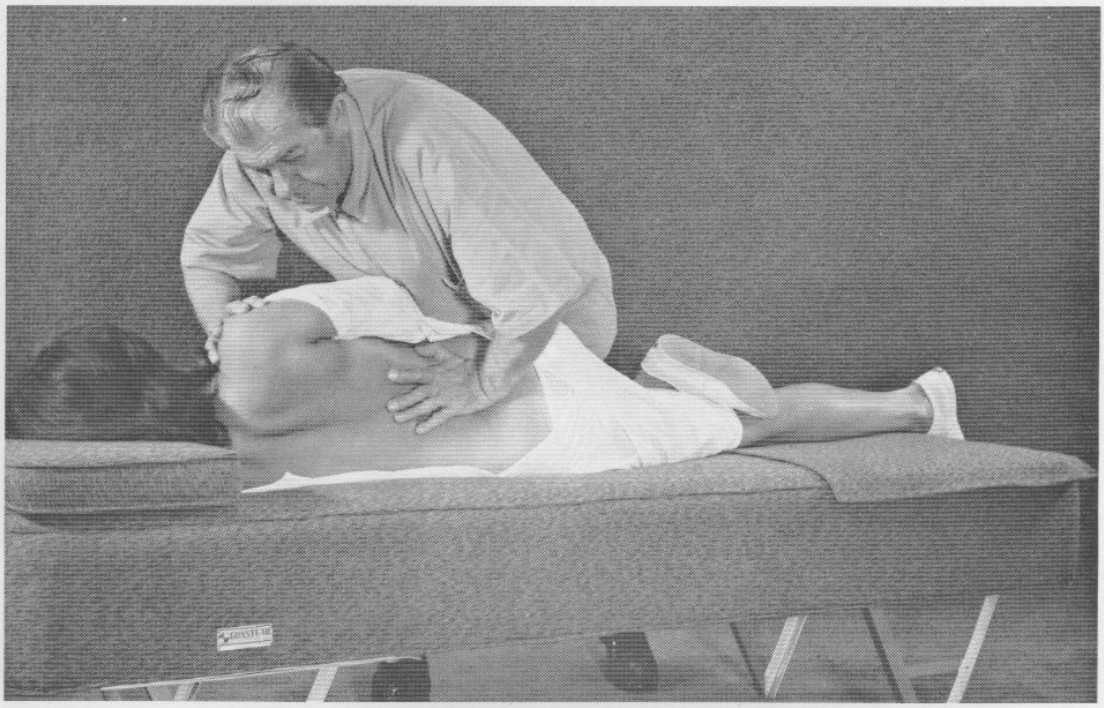


Figure 374: *Proper hand and arm positioning for a PL mammillary contact.*

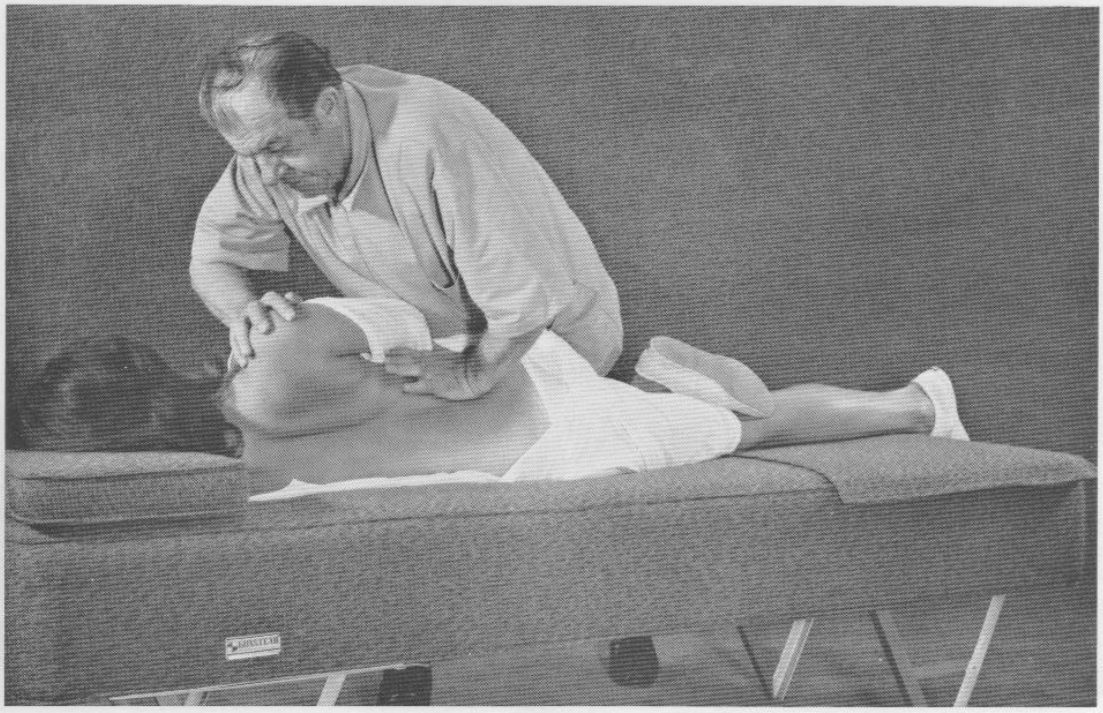


Figure 375: *Adjusting a PRS second lumbar subluxation.*

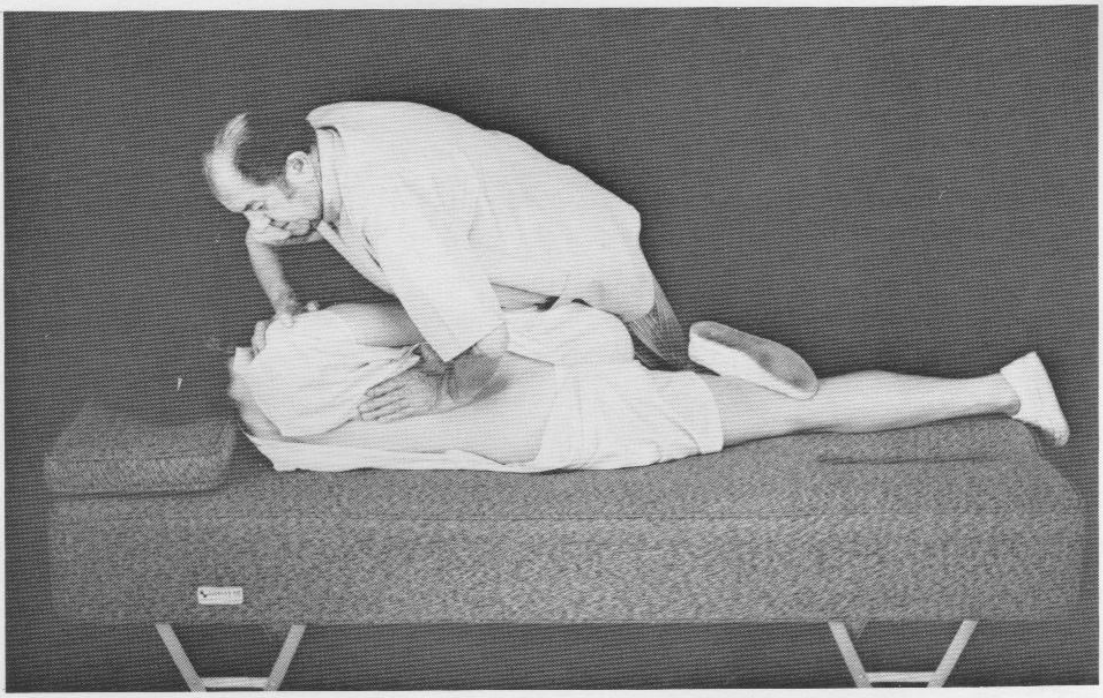
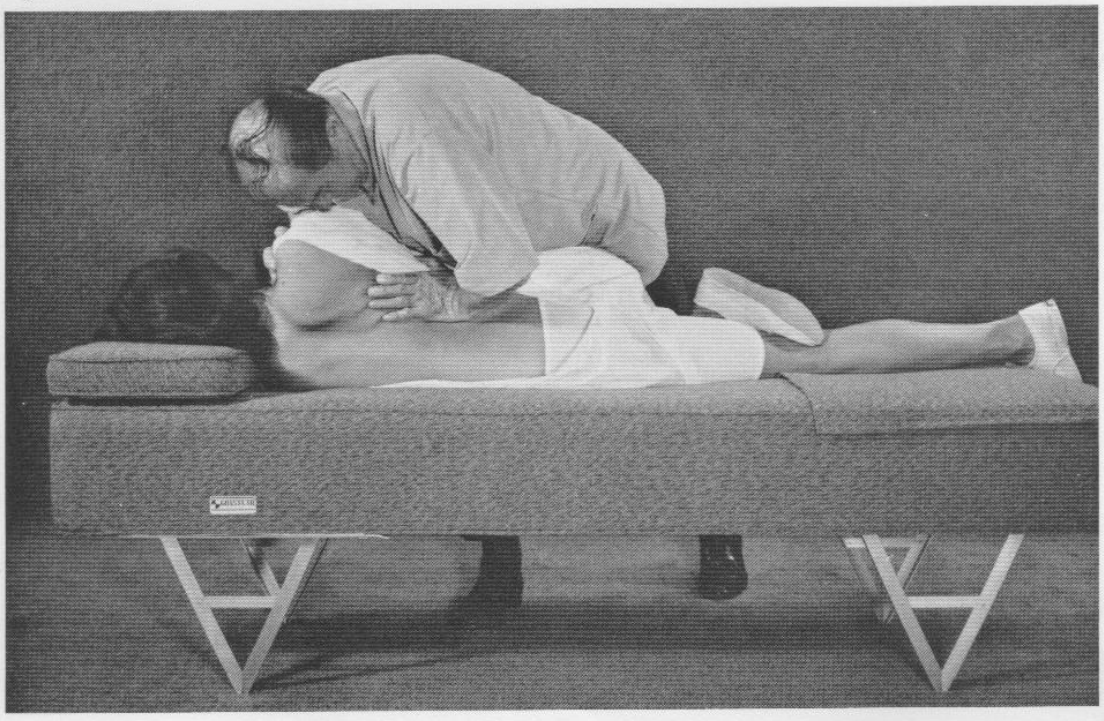


Figure 376: *Adjusting a PL-M second lumbar subluxation.*



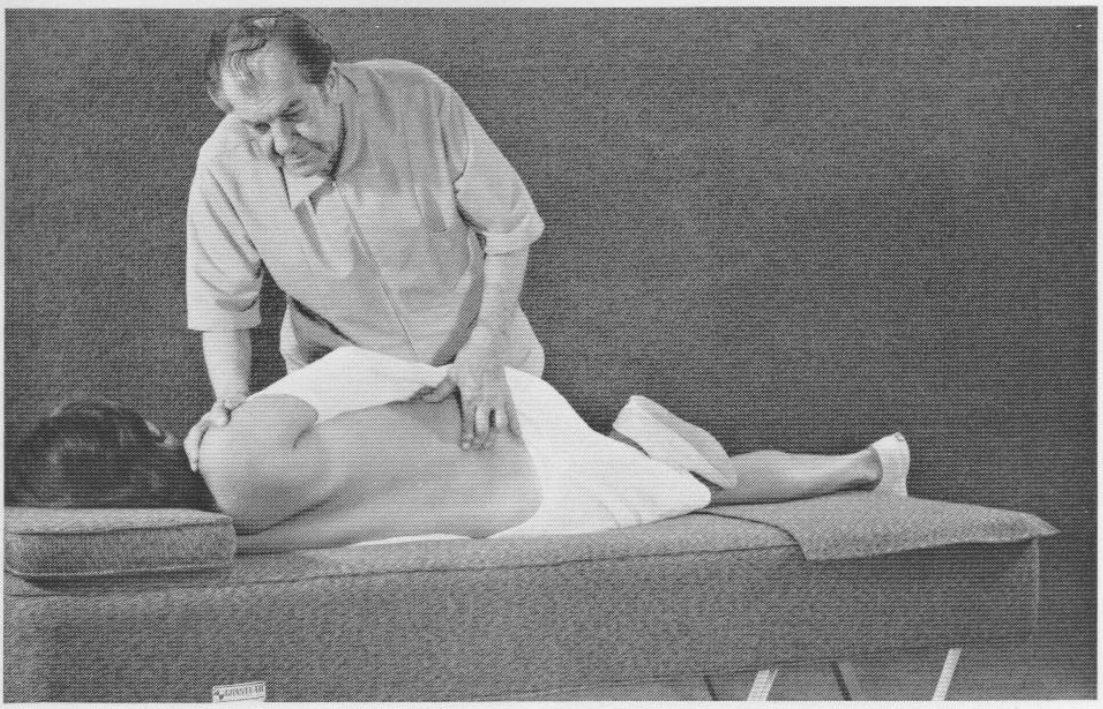
Pull Moves

Pull moves are primarily used when the lumbar subluxation involves a considerable amount of body rotation (or spinous laterality). This is often the case when the lumbar lordosis is reduced, which is a direct result of the rotation. A similar condition exists when lower cervical or upper thoracic rotation produces a compensatory loss of cervical lordosis. In most cases, posteriority will also be reduced before a good P to A correction is effected. The term "pull move" is actually a misnomer, since the rotation is still corrected with a P to A direction of thrust. However, due to the position of the forearm, it appears as though the vertebra is pulled in the P to A direction. Although the forearm is positioned in front of the spine, the fingers of the contact hand, which contact the vertebra and deliver the thrust, are positioned behind the spine and direct the thrust in a P to A, as well as lateral, direction.

Pull moves are effective for listings that require either a spinous or a mammillary contact. When a spinous contact is appropriate, the patient is placed with the side of spinous laterality down on the table. If the subluxation has a PL listing (PL-Sp, PLS, PLS-Sp, or PLI-Sp. See page 73, chapter six.), the patient is positioned with the left side down. The doctor will use his left hand as the contact hand, and the right hand for the stabilization hand. The second and third fingers of the contact hand are placed on the contact point, which is the left lateral side of the spinous process. The thumb of the contact hand is placed on the opposite side of the spinous process (the right lateral side), about four or five inches from the spinous, and slightly superior to it. This will allow the palmar surface of the hand to be parallel to the patient's body (Fig. 377). The stabilization hand then reduces the slack in the spinal tissues by applying moderate traction to the patient's shoulder in a superior and posterior direction. Before the thrust is given, the doctor stabilizes the patient's pelvis by placing his leg on the patient's thigh in the same manner as when adjusting an ilium pull move.

The thrust is made with a very quick pivotal action of the wrist. The thumb serves as the pivot point. The hand is pivoted so that the contacting finger tips apply a P to A and medialward force through the spinous process, thereby reducing posteriority and spinous laterality at the same time. When lateral

Figure 377: *Placement of the contact hand for a PL spinous pull move.*



wedging constitutes a part of the listing, the spinous process is torqued superiorward or inferiorward by the tips of the fingers in order to correct the lateral wedging. Figure 377 shows the proper setup for a PL-Sp fifth lumbar subluxation.

When the listing requires a mammillary process contact, the patient is still placed with the side of spinous laterality down on the table. Now, however, instead of the spinous process being the sole contact point, the emphasis is shifted to the mammillary. Whereas the second and third fingers were placed on the lateral surface of the spinous process previously, the third and fourth fingers now contact the spinous, and the second finger is placed on the mammillary process (Fig. 378). The direction of thrust is similar to that of a spinous contact, with the third and fourth finger tips applying a P to A and medialward force through the spinous. However, the second finger tip applies a very forceful P to A thrust through the mammillary process at the same time. The thrust is made entirely with the pivotal action of the wrist, and the thumb serves as the pivot point for the hand. It should be pointed out that the correction of body rotation takes place not only because of the medialward force through the spinous process, but also because a P to A force is applied *through the mammillary process on the side of body rotation.* In addition, since most cases with a lot of lumbar rotation will also have lateral wedging, the mammillary will also receive most of the torque to reduce the lateral wedging. The torque is applied in the usual manner, either superiorward or inferiorward. Figure 378 illustrates the proper setup for PL-M or PLI-M fourth or fifth lumbar, or in the case of fifth lumbar only, for a PLS-M subluxation.

The upper lumbar vertebrae may also be adjusted with a mammillary contact pull move. Figure 379 shows a second lumbar with a PL-M or PLI-M listing being corrected.

All pull moves require stabilization of the patient's pelvis by having the doctor's tibia resting on the patient's thigh. The medial border of the patient's flexed leg should not be pressed hard against the pelvic table, as this is not only uncomfortable, but it also prevents the proper balance and control when reducing the slack in the spinal tissues. Nor should the patient be rolled too far forward, as this would cause the thrust to be directed into the table instead of toward the doctor. Another error that is sometimes made is to use the wrong leg to stabilize the pelvis. If the doctor's right hand is the contact hand, then the right leg will be used to stabilize the patient, and visa versa. Figure 380 illustrates the correct positioning of the patient and doctor when a pull move is about to be executed.

Figure 378: *Placement of the contact hand for a PL mammillary pull move.*

Figure 379: *Adjusting a PL mammillary contact with the pull move.*

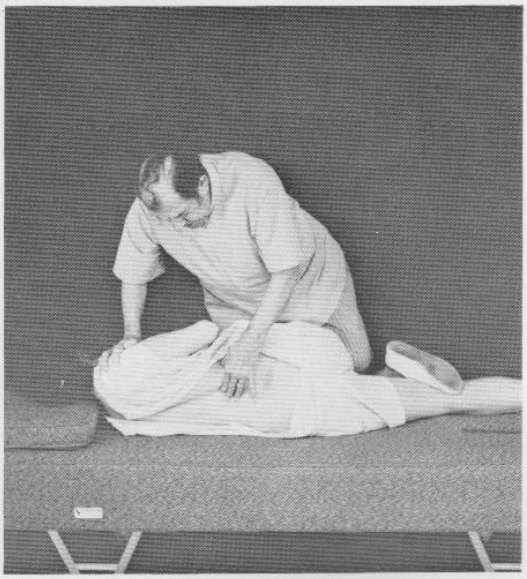
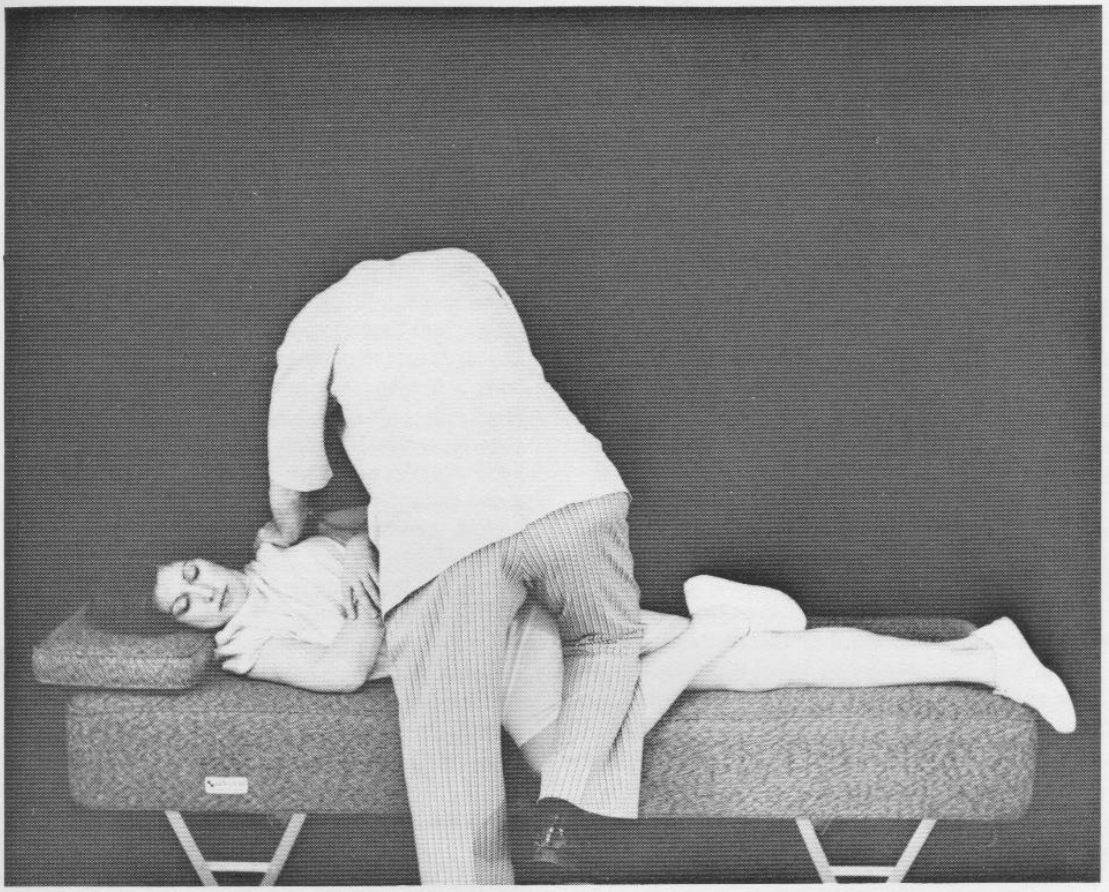


Figure 380: *Stabilizing the patient's pelvis for a pull move.*



Fifth Lumbar Lamina-Transverse Contact

A very effective method for correcting fifth lumbar subluxations, particularly when there is considerable posteriority, is with a lamina-transverse contact. Such a pull move is suitable only to the fifth lumbar because the transverse process unites with the body of the vertebra as well as with the pedicle. In addition, the fifth lumbar transverse is much stronger than the other lumbar transverses. When the contact hand is placed, the tip of the second finger is on the transverse process, and the tip of the third finger is on the lamina. All other aspects of the adjustment remain the same.

Lumbar Adjustments on The Knee-Chest Table

All of the lumbar vertebrae may be adjusted with the knee-chest table. Both spinous and mammillary contacts may be used. When the listing requires a spinous contact, the doctor stands on the side of spinous laterality. When the doctor is standing on the right side of the patient, as for a PRS-Sp, for example, the doctor's left hand will be the contact hand for adjusting a fifth, fourth, or third lumbar. The left hand,

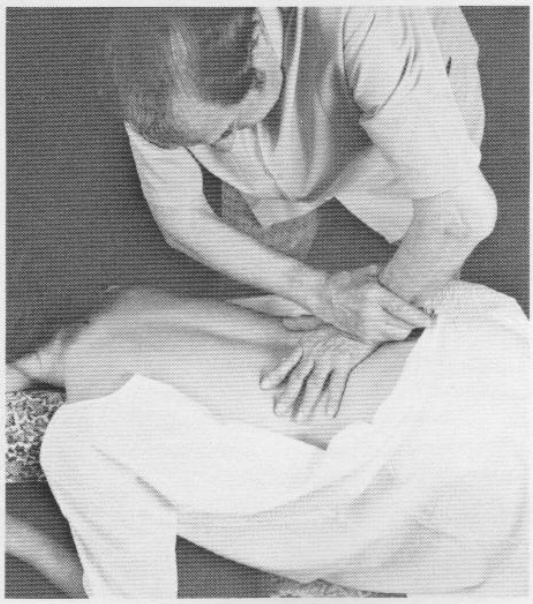
or "inferior" hand, as it is referred to, is used because the direction of thrust will usually be slightly inferiorward, through the plane line of the disc. When the plane line changes to a more superiorward direction, as when adjusting a second or first lumbar, the "superior", or right hand, will become the contact hand. Actually, either hand may be used to adjust the third lumbar, since the plane line of the third lumbar disc will usually be in a P to A direction only, without any inferiority or superiority. It all depends on the curvature of the individual's lumbar spine. It also depends on whatever feels comfortable to the doctor. If the superior hand were used to thrust in an inferior direction, however, it would be awkward for most people. The designation of the contact hand as superior or inferior is made in reference to the position of the doctor and patient. When the doctor stands on the left side of the patient, as when adjusting PL listings with a spinous contact, the doctor's left hand becomes the superior hand since it is cephalad, and his right hand, being toward the patient's feet, becomes the inferior hand.

The chest support section of the knee-chest table should be adjusted so that the patient's thoracic spine will be level with, or slightly lower than, the lumbar spine. The knees should be positioned so that the femurs are perpendicular. If this position doesn't allow the patient to be completely relaxed and balanced on the table, the knees should be brought backwards an inch or two, or until relaxation of the lumbar muscles is at a maximum. The doctor should place his contact hand under the patient's abdomen, and lift the abdomen superiorward to reduce the lumbar lordosis and expose the spinous processes. The other hand, which will be the stabilization hand, is then used for palpating and locating the spinous process of the vertebra to be adjusted. When the correct spinous is located, the doctor asks the patient to hold his lumbar spine upward, and he then removes his contact hand from underneath the patient's abdomen. He then places the pisiform of his contact hand on the spinous process, allowing the fingers to cross the spine at about a forty-five degree angle (Fig. 381). The contact is actually on the posterior and right lateral border of the spinous process for a PRS-Sp fifth lumbar listing, or a PRS listing of the other lumbar segments. The doctor then asks the patient to drop his lumbar spine downward, being careful to keep the pisiform on the contact point as he does so. The stabilization hand is then placed on top of the contact hand so that the fingers of the stabilization hand lightly grasp the wrist of the contact hand (Fig. 381). Then, with light, sustained pressure, the slack is taken out of the spinal muscles in the direction of thrust, that is, anteriorward, medialward, and, depending on whether it is a lower or upper lumbar, inferiorward or superiorward, through the plane line of the disc. The thrust is then given quickly, and with controlled depth, with both the contact hand and stabilization hand simultaneously. The spinous is torqued superiorward or inferiorward if lateral wedging is a component of the listing.

Figure 381 shows the doctor-patient setup for a lower lumbar PR spinous contact. The doctor is shown bent over the pateint with the elbows slightly flexed. Before the thrust is given, he raises his entire body a few inches by extending his arms at the elbows, but without releasing any of the slack at the conatact point. He then thrusts by flexing his elbows slightly, while at the same time dropping his entire body downward. The thrust is actually made with a coordinated arm motion and body drop, which eliminates any jabbing effect that would be painful to the patient.

When adjusting mammillary contacts on the knee-chest table, the preferred method is for the doctor to stand on the side of spinous laterality, that is, on the opposite side of body rotation. On very large patients, it is possible to stand on the side of the mammillary being adjusted, but with the average

Figure 381: *Adjusting a PR spinous contact on the knee-chest table.*



patient this usually causes the thrust to push the patient away from the doctor. The procedure before the adjustment is the same as for spinous contacts. The inferior hand remains the contact hand for the lower lumbars, and for the upper lumbars, the superior hand is the contact hand. Either hand may be used for the third lumbar, depending on the amount of lordosis and the plane line of the disc. The doctor lifts the abdomen with the contact hand and locates the mammillary process of the vertebra to be adjusted with the stabilization hand. The pisiform is placed on the contact point, and the abdomen is lowered. Then the stabilization hand is placed over the contact hand and the slack is reduced. Before the thrust is made, the doctor may rest his inferior leg against the patient's hip to further stabilize the patient's body. This is not essential but with lighter patients it prevents the thrust from moving the patient's body lateralward toward the doctor. A quick thrust with controlled depth is then given through the plane line of the disc. In a lower lumbar, the direction of thrust will be anteriorward, inferiorward, and medialward. For an upper lumbar the direction of thrust will be anteriorward, superiorward, and medialward. If lateral wedging is a component of the listing, the mammillary will be torqued superiorward or inferiorward to correct it.

Figure 382 illustrates the doctor-patient setup for a lower PR mammillary contact. The doctor's left, or "inferior" leg is stabilizing the patient's hip, and he is leaning far over the patient in order to direct the thrust P to A and medialward. The doctor is also leaning slightly to his right so he can thrust inferiorward through the plane line of the disc. The instant of maximum thrust is clearly illustrated by the degree of elbow flexion and body drop.

In figure 383 a skeletal specimen is shown with the doctor standing on the side of the mammillary process being adjusted. The contact hand is placed so that the fingers run parallel to the spine instead of crossing over the spinous processes. Because the vertebra being adjusted is the second lumbar, the superior hand is the contact hand.

A lumbar vertebra will sometimes be subluxated posteriorward, without any perceptible body rotation or laterial wedging. This is particularly true of the fifth lumbar vertebra. The knee-chest table is ideally suited for correcting such a subluxation. The doctor may stand on either side of the patient, and should choose the inferior or superior hand as the contact hand according to the location of the lumbar and the degree of inferiority or superiority. The direction of thrust is anteriorward, and inferiorward or superiorward, through the plane of the disc. Figure 384 shows the doctor-patient setup for the correction of a posterior (P) fifth lumbar subluxation.

Figure 382: *Adjusting a PR mammillary contact on the knee-chest table.*

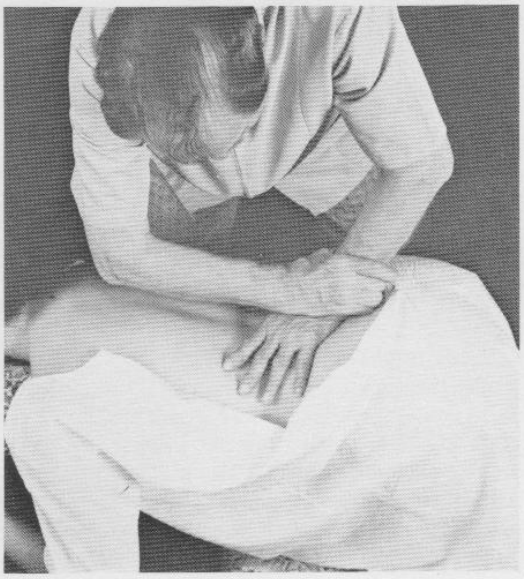


Figure 383: *Adjusting a second lumbar PR-M while standing on the side of the mammillary contact.*

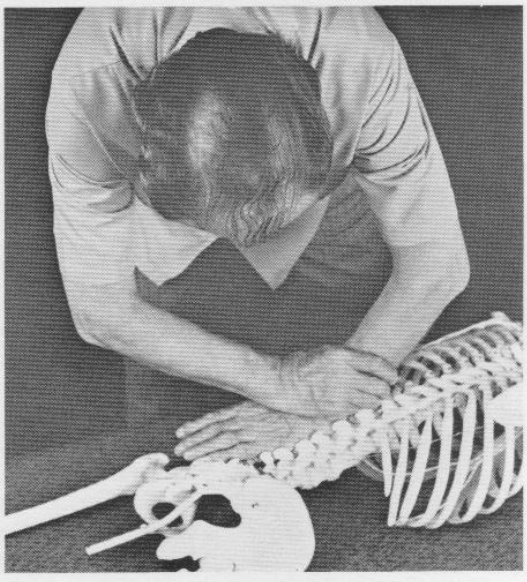
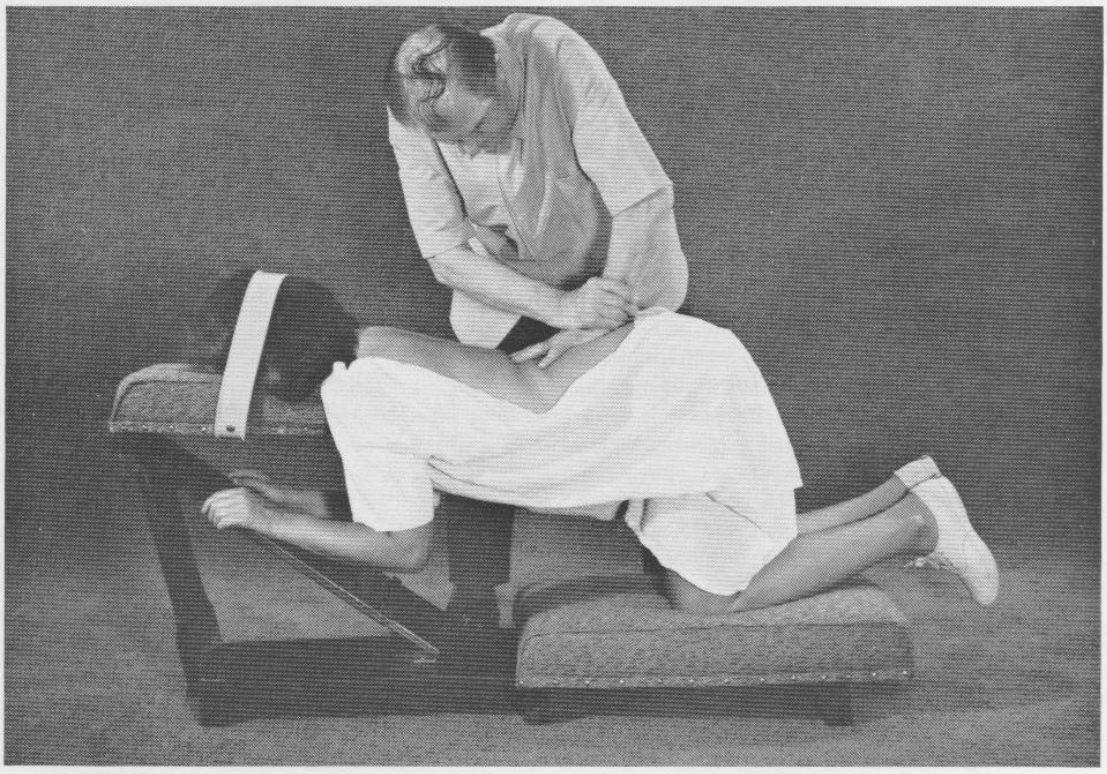


Figure 384: *Adjusting a posterior (P) fifth lumbar on the knee-chest table.*



Double Thenar Moves on The Knee-Chest Table

Lumbar subluxations may also be corrected on the knee-chest table with a double thenar move. This offers an alternative to the single hand contact, and provides a well stabilized and very comfortable adjustment from the patient's point of view. It is used most effectively when the listing calls for a mammillary contact, but is sometimes used for other listings as well. The doctor stands on the same side of the patient as the mammillary process being adjusted. That is, if the listing is PRI-M, the doctor will stand on the patient's left side. Instead of standing at a ninety degree angle to the patient longitudinally, he stands at about a forty-five degree angle, and slightly behind the vertebra being adjusted. The contact hand for a PR mammillary listing will be the left hand. The thenar eminence of the contact hand is placed on the mammillary so that the thumb is parallel to the spine (Fig. 385). More specifically, the base of the first metacarpal, which lies under the abductor pollicis brevis thenar muscle, is placed on the contact point. The base of the first metacarpal becomes quite prominent when the wrist is extended and the thumb is abducted as shown (Fig. 385). After the contact hand is placed, the thenar of the opposite hand, which serves as the stabilization hand, is placed on the opposite mammillary in like manner (Fig. 386). The slack is then reduced in the usual way, and the thrust is given through the plane line of the disc. The direction of thrust for a PR mammillary listing is anteriorward, and slightly inferiorward or superiorward, depending on the level of the lumbar being adjusted. If lateral wedging is a part of the listing, the mammillary should be torqued with the contact hand superiorward or inferiorward to reduce the wedging.

It should be emphasized that although the thenar of the stabilization hand is also placed on the mammillary process, the corrective thrust is entirely made with the contact hand. If equal thrust is given with both hands, the body rotation will not be corrected.

Figure 385: *Placement of the contact hand for a PR-M double thenar move.*

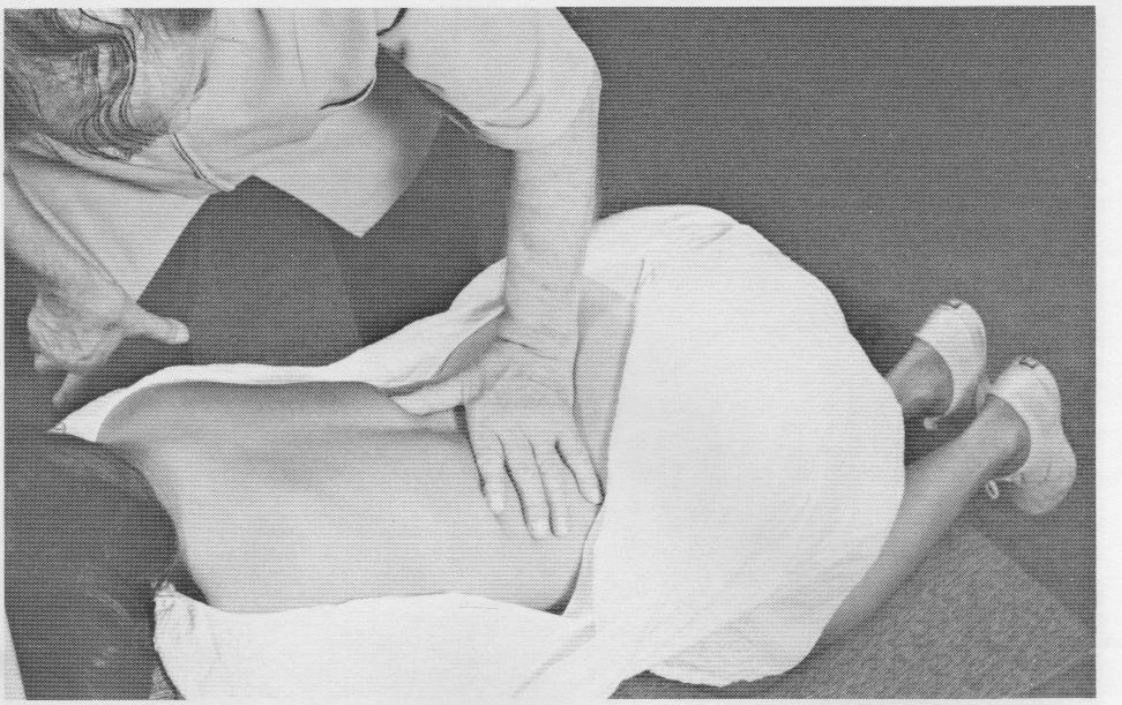


Figure 386: *Both hands placed for a double thenar move.*

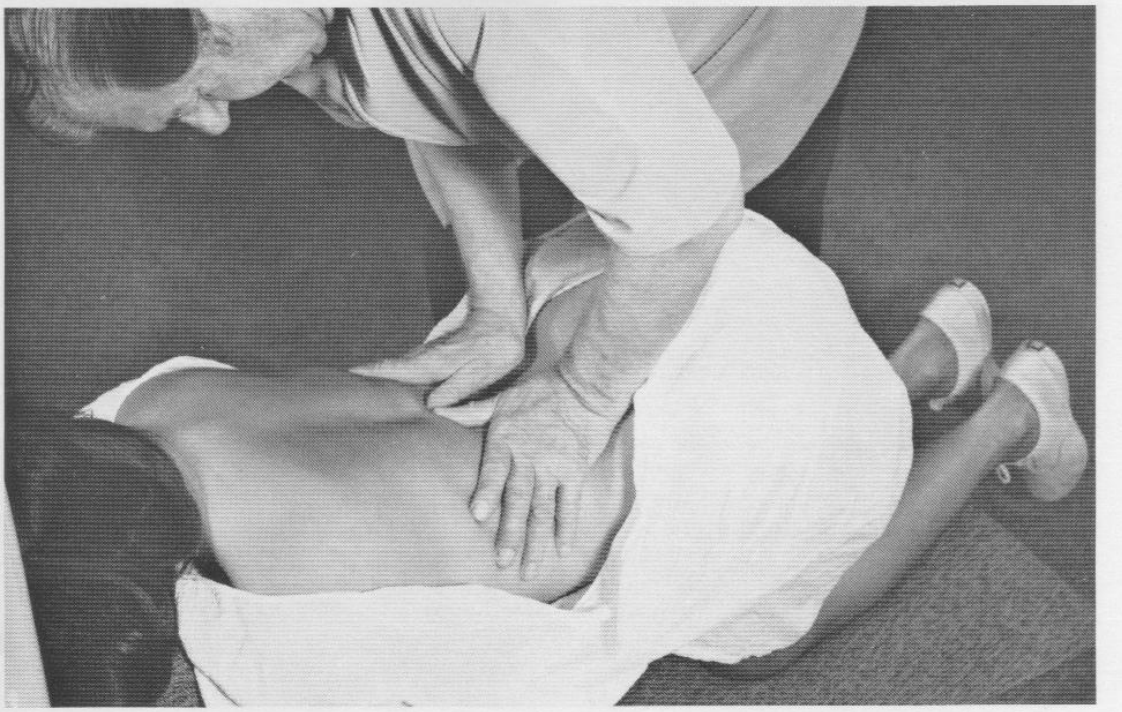
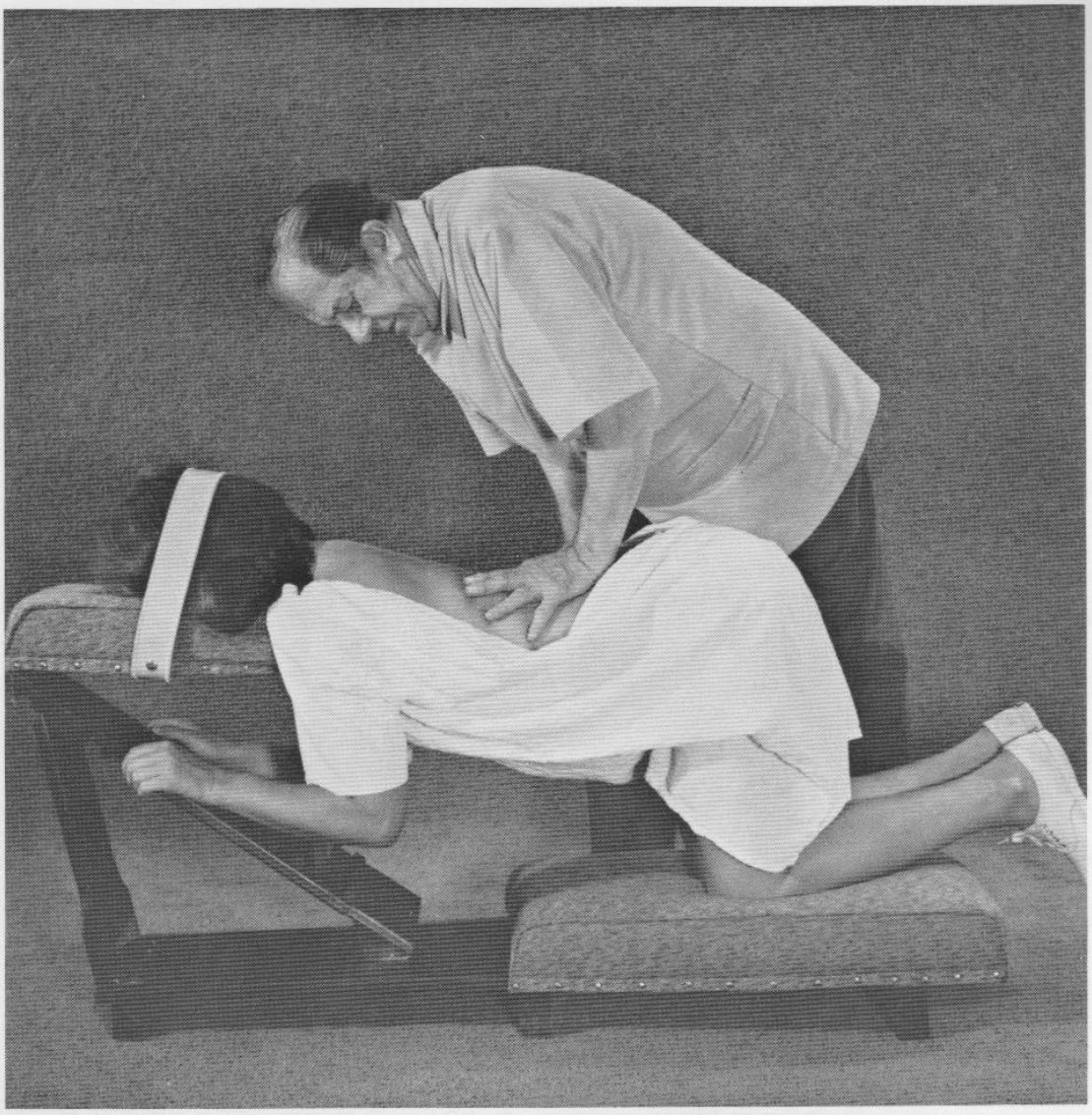


Figure 387: *Adjusting the fifth lumbar with a double thenar move.*

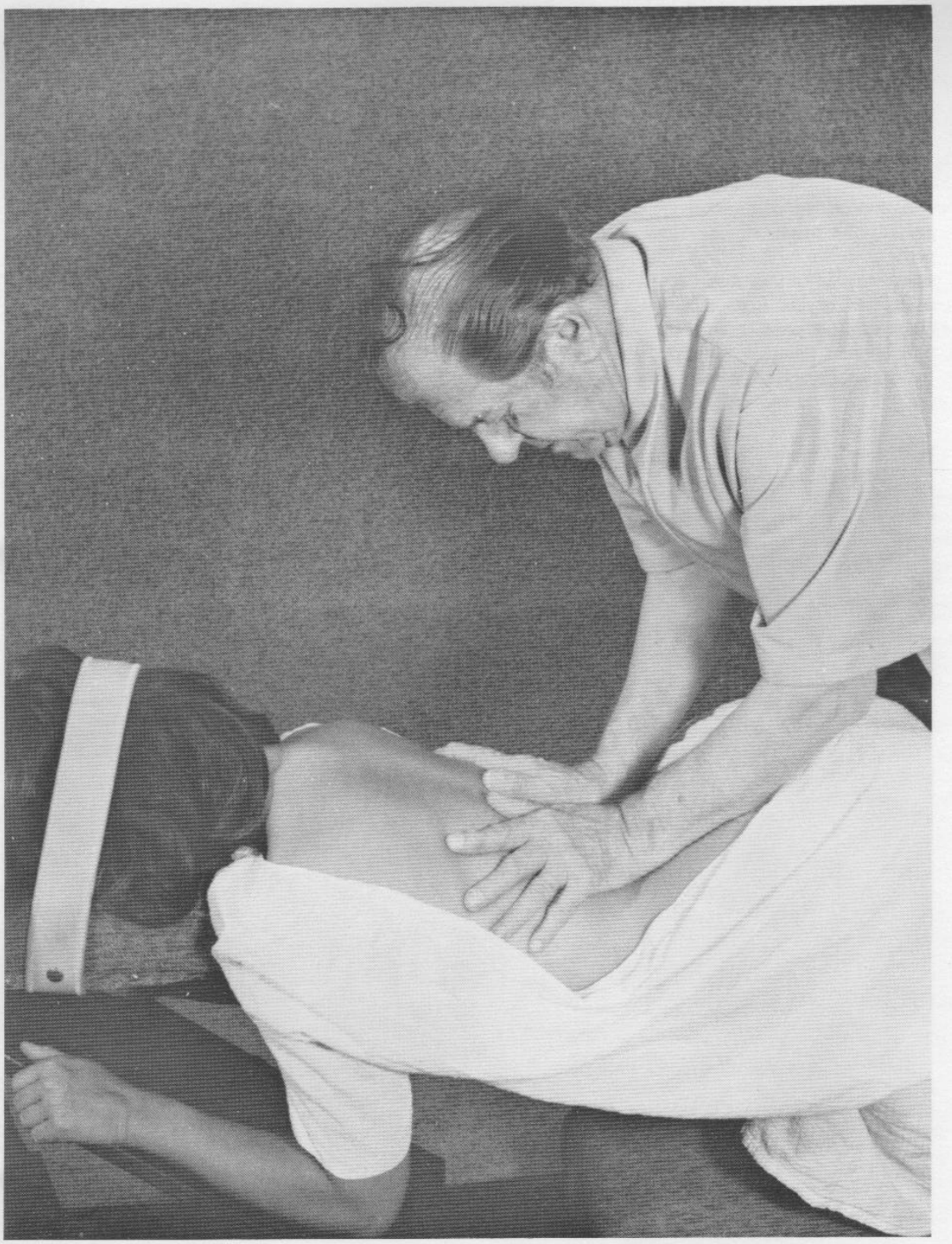


The stabilization hand merely stabilizes the patient's body as the corrective thrust is given.

Figure 387 shows the doctor-patient setup for a fifth lumbar double thenar adjustment. It can be seen that the doctor must lean forward in order to direct the thrust inferiorward through the lumbosacral disc. The direction of thrust is clearly evidenced by the angle of the doctor's arms. This angle will change according to the level of the lumbar being adjusted.

Figure 388 illustrates the more superiorward direction of thrust that is required for a first lumbar double thenar contact. Although the doctor's feet are placed in the same position, he is not leaning nearly so far forward. The direction of thrust, which is through the plane line of the first lumbar disc, is plainly indicated by the angle of the doctor's arms. The depth of the thrust for a double thenar adjustment must be carefully controlled, just as it is for a single hand contact. There is also a very quick wrist action, and a coordinated body drop and arm motion.

Figure 388: *Adjusting the first lumbar with a double thenar move.*



Double Thumb Contact

A very effective way of adjusting a straight posterior (P) fifth lumbar subluxation is with a double thumb contact. Since such a listing implies no lateral wedging or body rotation, the doctor may stand on either side of the patient. The distal phalanges of the thumbs are placed on the fifth lumbar spinous process, one on top of the other. With the thumbs abducted, the hands are stabilized on the patient's pelvis as shown in figure 389. The doctor adjusts his stance so that he can direct the thrust through the plane line of the lumbosacral disc. An extremely quick thrust is given through the contact point with both thumbs simultaneously. Anterior movement of the thumbs is accomplished by pivoting on the fingers. Wrist action provides the speed. This adjustment is specific for the fifth lumbar vertebra, and is particularly useful when the spinous process is very small.

Lumbar Adjusting in The Prone Position

Lumbar adjustments may be performed effectively with the patient in the prone position. The table of choice is the Zenith Hi-Lo. The table should be arranged so that the pelvic section is flat. The spring release on the abdominal section should be in operation, and the tension should be moderately high. All of the information given about doctor-patient positioning, direction of thrust, etc., will remain the same as when adjusting on the knee-chest table.

Figure 389: *Adjusting a posterior (P) fifth lumbar with the double thumb move.*

Thoracic Corrections

Chapter 16

Gonstead Chiropractic Science & Healing Art

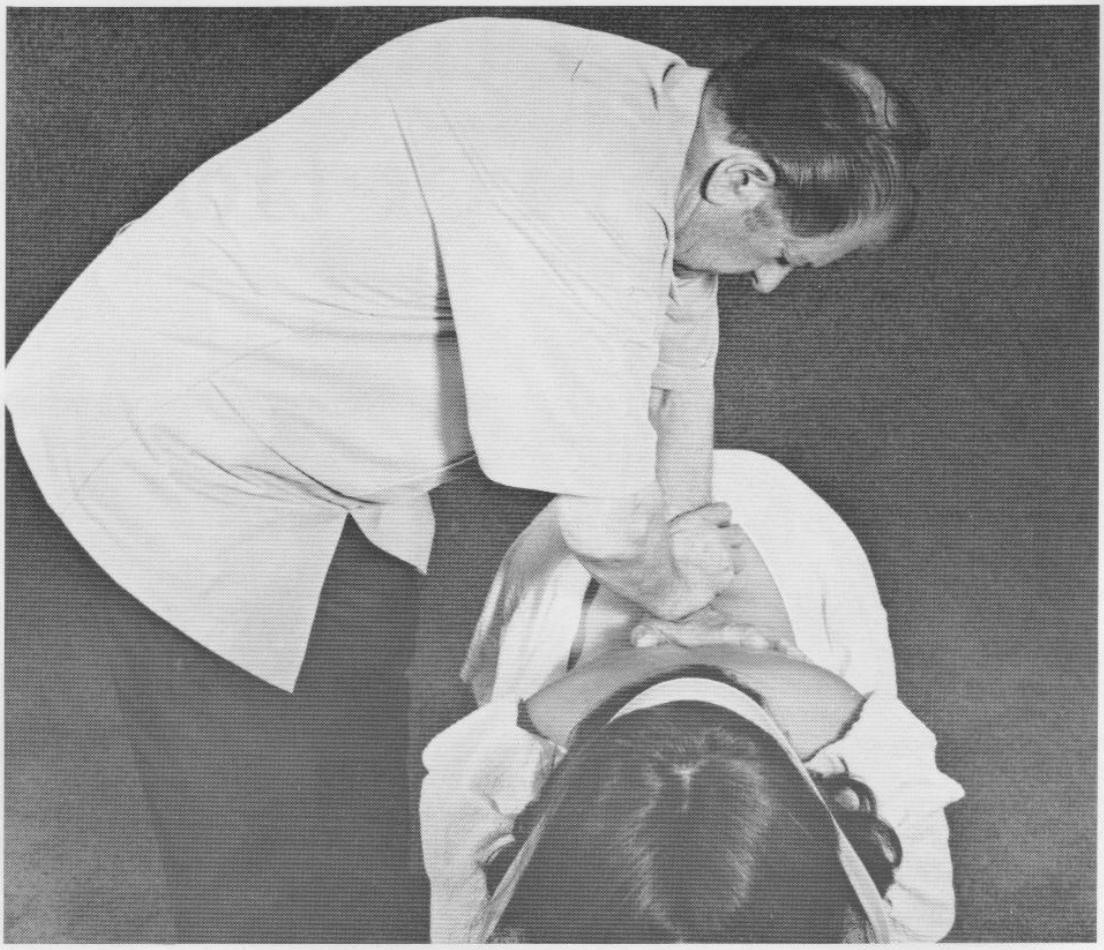
Chapter 16

Thoracic Corrections

Thoracic Adjustments on the Knee-Chest Table

The thoracic vertebrae are usually adjusted on the knee-chest table, or with the patient in the prone position on the Zenith Hi-Lo or some similar table. The upper two or three thoracics may also be adjusted with the patient in the sitting position, which will be covered in the next chapter. To avoid repetition, the instructions are given for the patient in the knee-chest position only, but all the details are virtually the same for the patient in the prone position.

Figure 390: *Adjusting a twelfth thoracic PRS listing.*



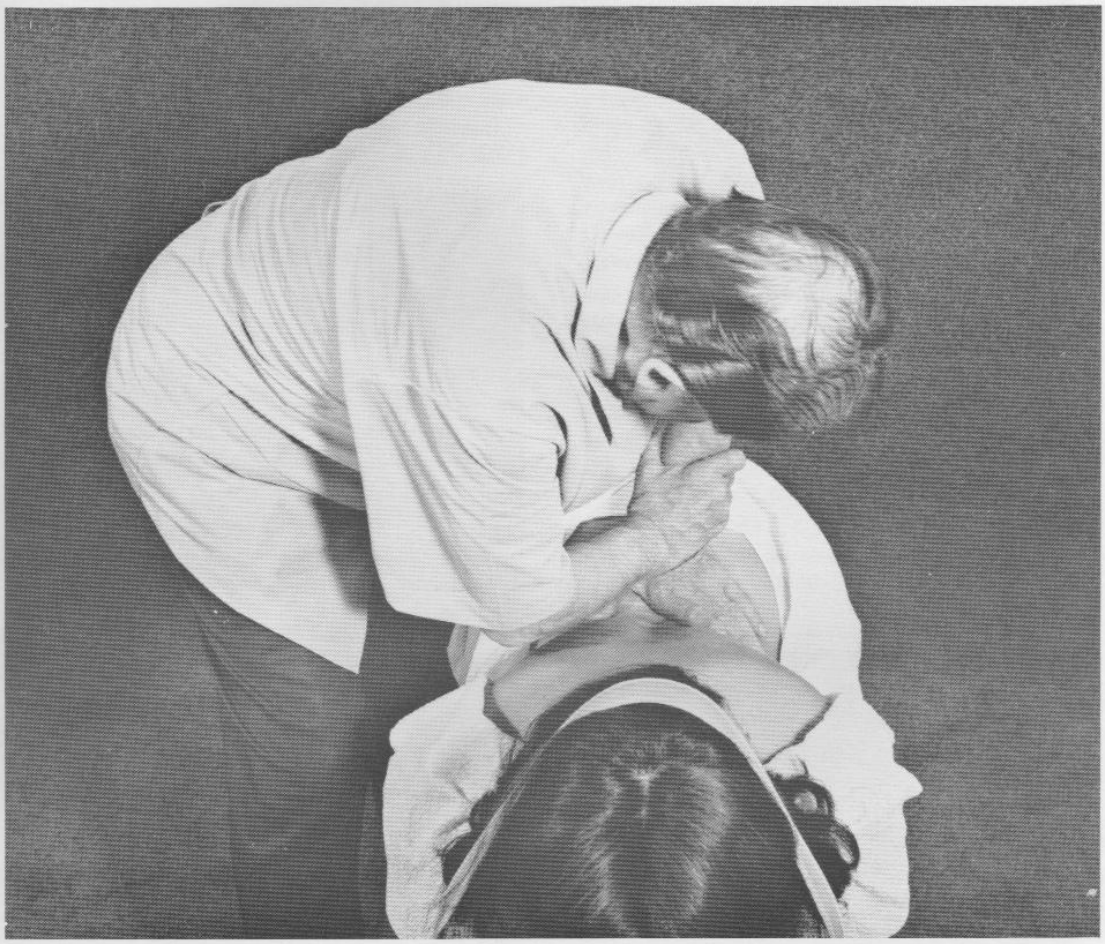
Adjusting the Tenth, Eleventh and Twelfth Thoracics

Spinous Contacts

When adjusting the lower thoracic vertebrae, the patient should be positioned on the knee-chest table with the chest support section level. The chest support section should be raised or lowered so that the lower thoracic spine is approximately level with the upper spine.

For a spinous contact, the doctor should stand on the side of spinous laterality. He faces the patient at approximately a ninety degree angle, and uses his superior hand to palpate and locate the spinous process being adjusted. He then places the pisiform of his inferior hand, which will be the contact hand, on the spinous process, with the fingers pointing superiorward, and crossing the spine at an angle. The fingers cross at about a forty-five degree angle or less, depending on what feels comfortable to the doctor, and according to the contours of the patient's spinal musculature. The superior hand, which will be the stabilization hand, is then placed over the wrist of the contact hand, so that both pisiforms are in line with the direction of thrust. The slack should be

Figure 391: *Adjusting a twelfth thoracic PRI-T listing.*



reduced with a light, sustained pressure. The thrust is made through the plane line of the disc, with a quick and coordinated motion of the arms and body. As always, the depth of the thrust must be controlled. The direction of thrust is anteriorward, medialward, and slightly superiorward. If lateral wedging is a part of the listing, torque should be applied through the contact point in order to reduce the wedging. Figure 390 illustrates the doctor-patient setup for a PRS twelfth thoracic adjustment.

Transverse Contacts

When the transverse process is the contact point, the doctor has the option of standing on either side of the patient. It is usually better to stand on the side of spinous laterality, and reach across the spine to the transverse process being adjusted. This affords more stability to the patient, and allows easier access to the line of drive. The setup is basically the same as when a spinous contact is used, except that the doctor reaches across the spine with his contact hand, and places the pisiform on the transverse process. Figure 391 shows the doctor-patient setup for a PRI-T twelfth thoracic adjustment. The torque will be applied clockwise to reduce the lateral wedging. The direction of thrust will be P to A, medialward, and slightly superiorward, the latter depending on the angle of the disc.

The illustration shows the doctor in the later stages of the thrust, as indicated by the position of his arms and body. Note also that he must reach quite far over the patient in order to direct the line of drive medialward through the transverse process.

Double Thenar Contacts

The lower thoracic vertebrae may also be adjusted with a double thenar move when the listing requires a transverse process contact. The doctor should stand on the side of the transverse being adjusted. He positions his body so that he is inferior to the area being corrected, since the direction of thrust will be slightly superiorward, through the plane line of the disc. He rotates his body at the waist so that his shoulders are parallel with those of the patient. The thenar eminence of the contact hand is placed on the transverse process, and the hand is positioned so that the thumb is parallel to the spine, and with the fingers extending around the lower thorax. After the contact hand is placed, the stabilization hand is positioned so that the pisiform is on the opposite transverse process. With the slack reduced, the thrust is made with the contact hand only. The stabilization hand merely steadies the patient's body. The direction of thrust is P to A, medialward, and slightly superiorward. Torque is applied through the thenar as necessary, in order to reduce the wedging. Figure 392 shows a front view of the doctor-patient setup for a PLI-T twelfth thoracic subluxation, using a double thenar adjustment. In figure 393 the same setup is shown from the left.

Figure 392: *Adjusting a PLI-T twelfth thoracic with a double thenar contact.*

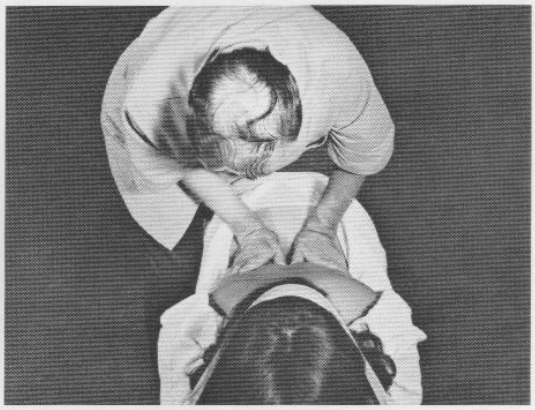
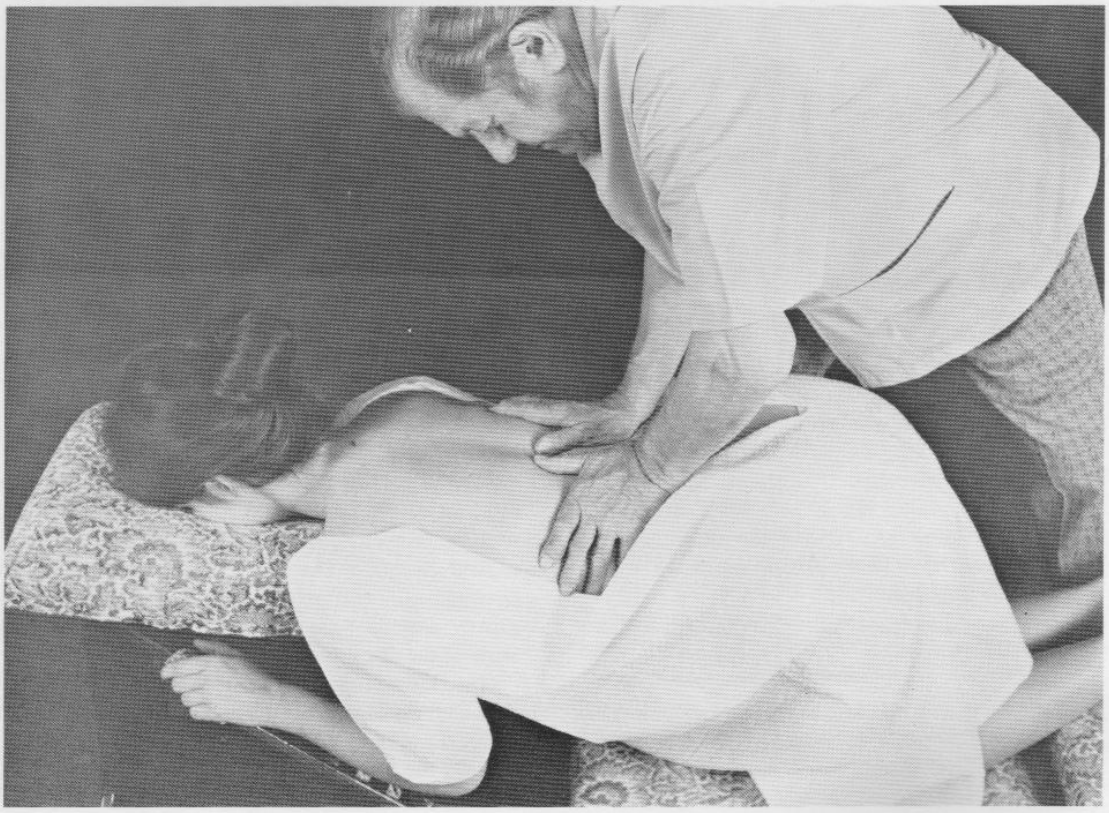


Figure 393: *A twelfth thoracic double thenar contact, with a slightly superiorward direction of thrust.*



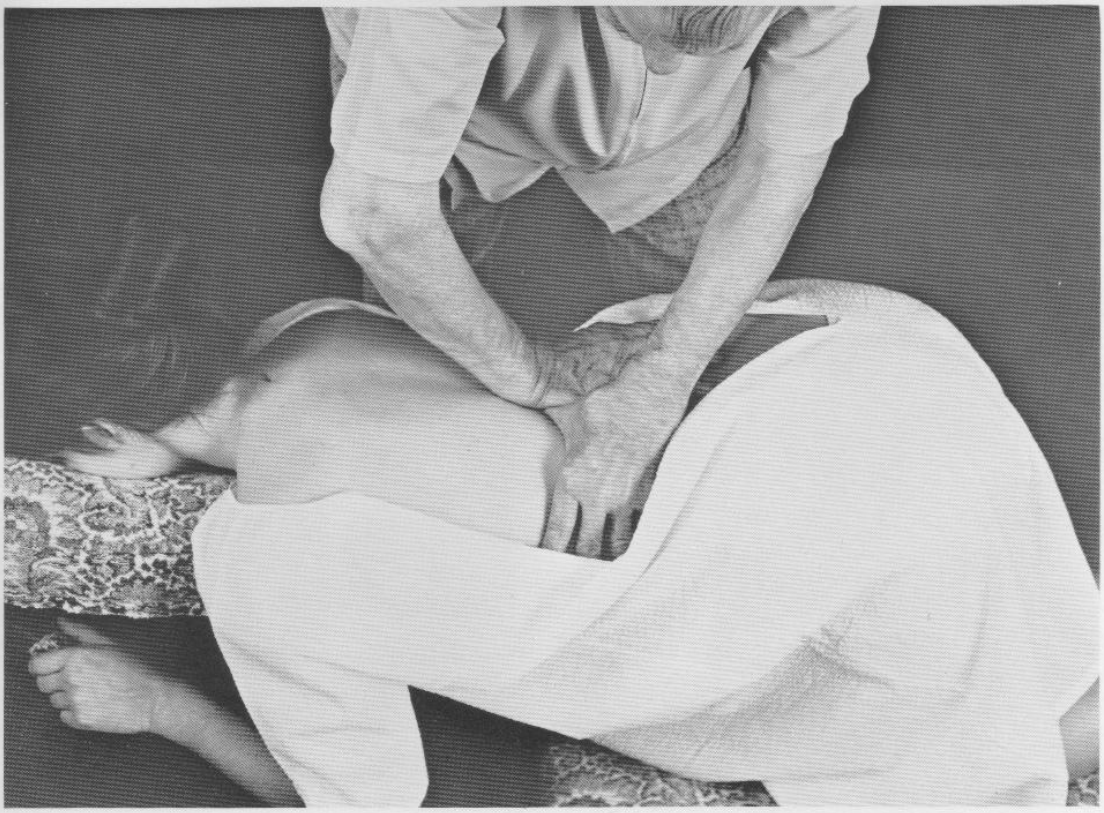
Pisiform-Thumb Contact

Because the transverse processes of the lower three thoracics are often deeply embedded in muscle, and since they lie relatively forward of their spinous processes, they are sometimes difficult to contact with the pisiform or thenar eminence. This is particularly true if the transverses are small or underdeveloped. As an alternative to the pisiform or double thenar contact, the pisiform-thumb contact may be used when the transverse process is the contact point. The doctor should stand on the side of spinous laterality, and reach across the spine to the transverse being adjusted. He locates the transverse by palpating with his superior hand, and then places the distal phalanx of the thumb of the inferior hand over the transverse process. The fingers should extend around the thorax as shown in figure 394. The pisiform of the superior hand is then placed on top of the distal phalanx of the thumb, and directly above the transverse process. After the slack is reduced, the thrust is given with both the pisiform and the thumb simultaneously. The direction of thrust is anteriorward, medialward and slightly superiorward, with torque when necessary. Figure 394 shows the doctor-patient setup using the pisiform-thumb contact for a PRI-T tenth thoracic adjustment. When the circumstances require it, the use of this contact will allow a deeper, and much more specific, adjustment.

Double Thumb Contact

The spinous processes of the tenth, eleventh and twelfth thoracics may also sometimes be small, and not provide a large enough surface area for specific spinous contact. When this is the case, a double thumb contact, similar to that used for adjusting a posterior fifth lumbar (see Chapter 15, page 224), may be used. The doctor should stand on the side of spinous laterality, and position himself as he would for a double thenar contact. The distal phalanges of the thumbs are then placed over the spinous process,

Figure 394: *A PRI-T tenth thoracic adjustment using a pisiform-thumb contact.*

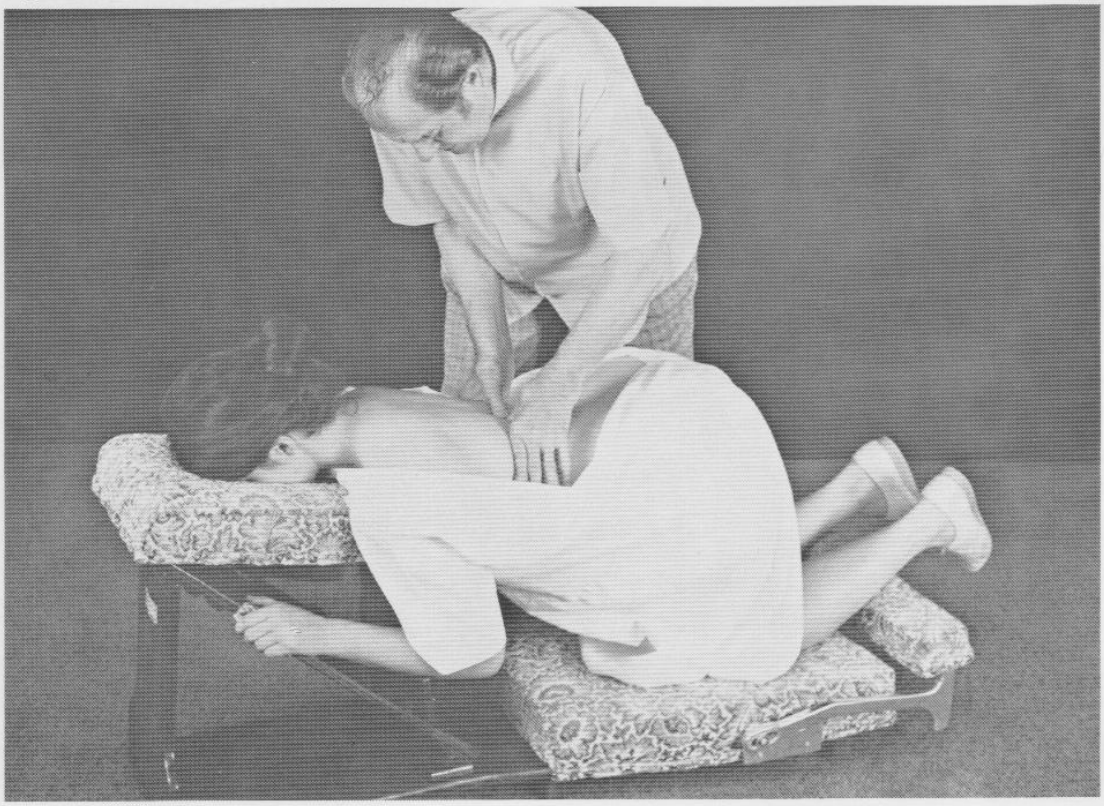


one thumb on top of the other. Either thumb may be placed first. The index fingers rest on the patient's thorax, as shown in figure 395. They stabilize the patient, and serve as pivot points for the thumbs. The thrust is given with both thumbs simultaneously, in a P to A, medialward, and slightly superior direction. When indicated, torque is used to correct lateral wedging. Figure 395 illustrates the doctor-patient setup for a PRS listing, using a double thumb contact.

Adjusting the Middle Thoracics

For our purposes here, the middle thoracics shall be considered the fourth through the ninth thoracic vertebrae. When adjusting these middle six thoracic segments, the chest support section should be arranged so that the patient's thoracic spine is slightly higher than the lumbar spine. There should be a slight incline on the chest support, to allow anterior expansion of the thoracic spine when the P to A thrust is given. The knees should be placed so that the femurs are perpendicular to the floor, or perhaps back slightly so that the abdomen can be dropped as far downward as possible. It is common for the patient to have the abdominal muscles contracted while the doctor is attempting to adjust the thoracic spine on the knee-chest table. The patient usually does this because he is not comfortably placed on the table. The knees must be positioned so that the patient can relax fully. If the patient's lumbar spine is not at least slightly lordotic while he is on the knee-chest table, it is a sure sign that he is tensing his abdominal muscles, and is not completely relaxed. (An exception to this rule may be a posterior base sacrum.) This tension will usually prevent the movement of the vertebra, whether it is the lumbar or the thoracic spine being adjusted. Before making a thoracic adjustment, therefore, the doctor must be sure that the patient's abdominal muscles are relaxed, that the abdomen is dropped all the way down, and that the lumbar spine is as lordotic as possible.

Figure 395: *A double thumb contact for a PRS tenth thoracic listing.*



Due to the fact that the middle thoracic spine usually presents a kyphotic curvature, and that this curvature is flattened out in the prone or knee-chest position, the direction of thrust through the plane line of the disc becomes P to A only, without any appreciable amount of superiority or inferiority. Therefore, the doctor stands directly above the segment being adjusted, and uses his superior hand as the contact hand. Figure 396 illustrates the correct positioning of the doctor for a PRS ninth thoracic adjustment. His head is directly above the pisiform of his contact hand, and he is evenly balanced on both feet. In contrast, figure 397 shows the doctor standing inferior to the segment being adjusted, causing the direction of thrust to be slightly superiorward. For the listing being demonstrated, a PRS sixth thoracic, the doctor is off balance, and is not directing the thrust through the plane line of the disc. This would interfere with the P to A movement of the vertebra, and may even bind the vertebra on the disc so that no movement occurs at all.

It should be remembered that due to the imbrication of the middle thoracic spinous processes, the pisiform of the contact hand must be placed as far up the spinous process as possible, without being on the spinous of the segment above. If the contact is made on the inferior tip of the spinous, the force will be directed through the vertebra below the subluxation, and no correction will occur. This is particularly true of segments T6 through T9.

Figure 398 shows the doctor-patient setup for correcting a PRS sixth thoracic subluxation. The direction of thrust is P to A, medialward, and with the torque applied in a clockwise direction. In figure 399, the doctor is shown leaning considerably further

Figure 396: *Adjusting a ninth thoracic PRS listing, showing the doctor to be directly above the listing for the P to A thrust.*

Figure 397: *A sixth thoracic PRS listing, showing the doctor off balance, and not directly above the segment.*

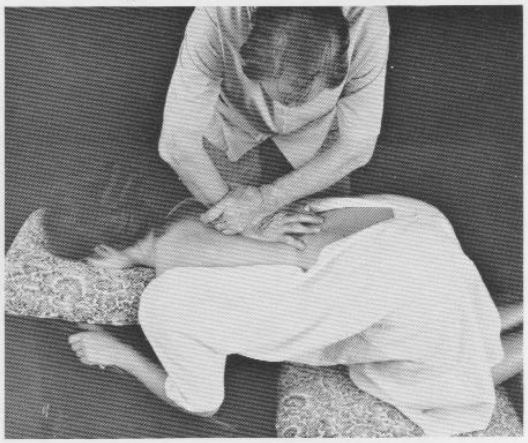


Figure 398: *Adjusting a sixth thoracic PRS listing.*

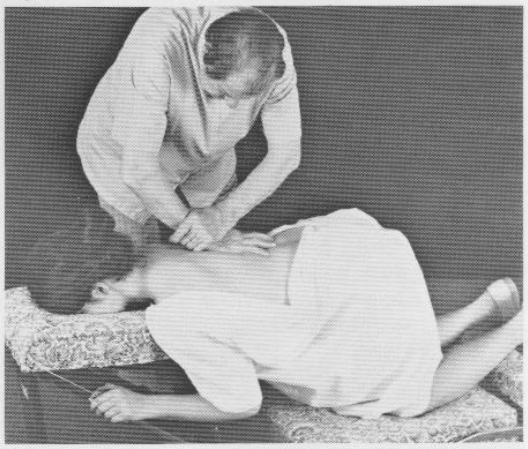
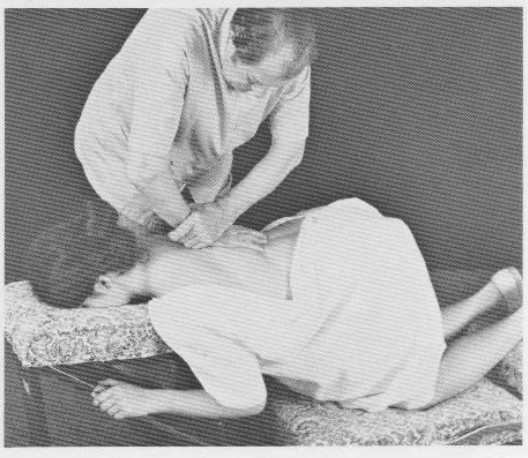


Figure 399: *Adjusting a sixth thoracic PRI-T listing.*



over the patient. This shows the setup for a PRI-T sixth thoracic subluxation. The direction of thrust is anteriorward, medialward, and with counterclockwise torque.

Figure 400 shows the relationship of the doctor to the patient, and the correct positioning of the hands, for a PRS fourth thoracic listing. The direction of thrust is P to A, and medialward, the latter to correct spinous laterality. The spinous should be torqued clockwise in order to reduce the lateral wedging. In figure 401, the doctor's hands are positioned for a PRI-T fourth thoracic listing, in which he is reaching over the spine to contact the transverse process with the superior contact hand. The figure illustrates the position of the doctor after the thrust is given, and shows the rotation of his hands and body due to the torque. The direction of torque is counterclockwise.

Occasionally, it may be practicable to adjust a transverse contact by standing on the same side as the transverse being adjusted. This would especially apply to someone who is very stable on the knee-chest table, such as a heavy or large person. In figure 402, the correct positioning of the hands for a PRI-T listing is demonstrated on a skeletal specimen. Notice that the fingers of the contact hand do not cross the spinous processes. This is to prevent the thrust from driving the spinous process further lateralward, and thereby increasing spinous laterality and body rotation. The thrust, therefore, should be applied only on the transverse process, and is given in a P to A direction, and medialward. The direction of torque, when standing on the side of the transverse being adjusted, is counterclockwise for a PRI-T listing.

The doctor-patient setup for a PRI-T listing is shown in figure 403.

Figure 400: *Adjusting a fourth thoracic PRS listing.*

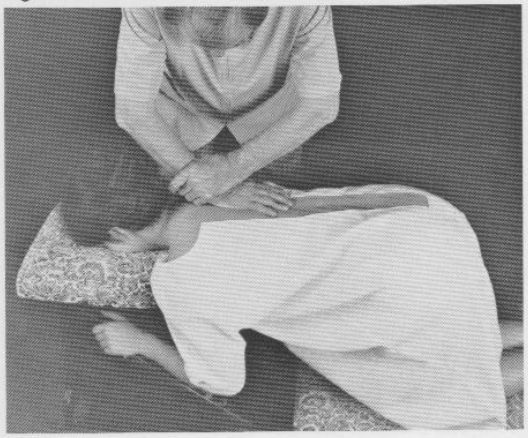


Figure 401: *Adjusting a fourth thoracic PRI-T listing.*

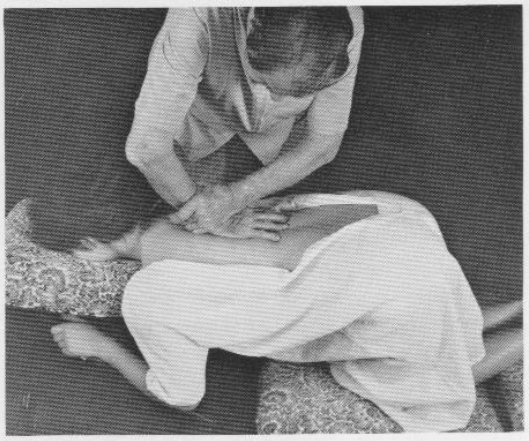


Figure 402: *Adjusting a fourth thoracic PRI-T while standing on the side of the transverse contact.*

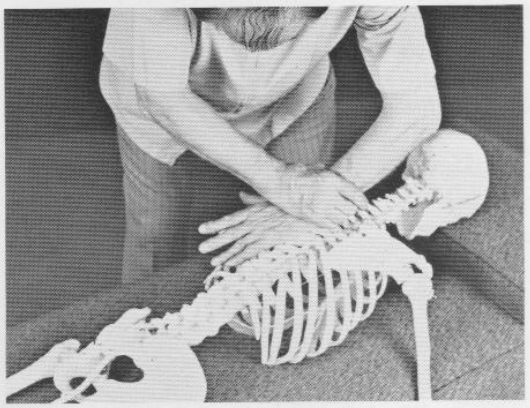


Figure 403: *The doctor-patient setup for a PRI-T listing while standing on the side of the transverse contact.*

Adjusting the First, Second and Third Thoracics

When adjusting the upper thoracic vertebrae, the chest support section of the knee-chest table should be elevated so that the upper thoracic spine is slightly higher than the rest of the spine. The chest support section should also be on an incline, so that the head is raised higher than the upper thoracic spine. This is to allow anterior expansion of the spine, so that P to A movement of the vertebra is possible. In addition, by raising the head, the kyphotic upper thoracic spine will be flattened, thus allowing more anterior expansion of the spine, and reduction of the slack in the anterior spinal ligaments. While the stabilization strap should be used for all knee-chest adjustments, it should especially be used when making upper thoracic corrections. The head should be securely fastened to the chest support section so that hyperextension of the neck does not occur when the spine is adjusted anteriorward.

Figure 404 shows a third thoracic vertebra being adjusted for a PRS subluxation. The doctor is standing on the side of spinous laterality, and is using his superior hand as the contact hand. The pisiform is placed over the spinous, with the fingers crossing the spinouses in the usual manner. The direction of thrust is through the plane line of the disc in a P to A and medialward direction. The torque is clockwise.

In figure 405, the doctor is shown reaching across the spine to contact the opposite transverse process. This is the preferred method for a transverse contact, although standing on the same side as the transverse being adjusted is permitted when the patient is large or well stabilized on the table. In figure 405 the listing is a PRI-T. The doctor is leaning far over the patient in order to effectively direct the thrust anteriorward and medialward. His body is in a rotated position, after having used counterclockwise torque to reduce the lateral wedging.

When adjusting a first thoracic, or even a second or third thoracic in a particularly kyphotic thoracic spine, the direction of thrust will assume a slightly inferiorward line of drive. This is necessary in order to follow the plane line of the disc. This will require the doctor to stand slightly above the segment being contacted, so that he is balanced and comfortable when making the thrust inferiorward. Figure 406 shows the doctor in position for a PRS first thoracic adjustment, using his superior hand as the contact hand.

Figure 404: *Adjusting a third thoracic PRS listing.*

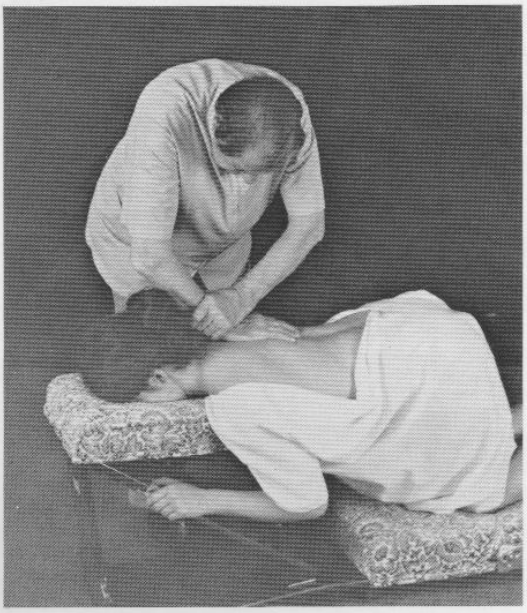
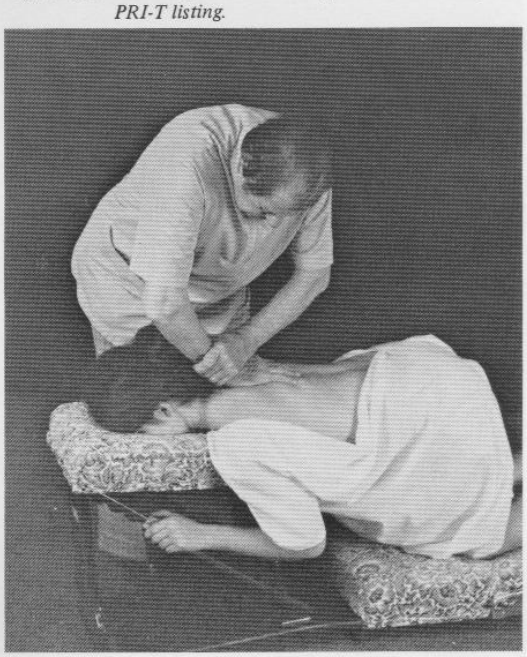


Figure 405: *Reaching across to the opposite transverse for a PRI-T listing.*



Upper Thoracic Contacts With the Inferior Hand

When the plane line of the disc assumes an inferiorward direction, the correction is usually more easily accomplished by using the inferior hand as the contact hand. When the upper thoracic spine is kyphotic, the inferior hand may be used for the first, second or third thoracics, or sometimes even lower. But even when the thoracic spine is not particularly kyphotic, the first thoracic segment is usually adjusted with the inferior hand. The direction of thrust for correcting a first thoracic subluxation is almost always slightly inferiorward, due to the curvature of the spine as it changes from kyphotic to lordotic in the neck.

Figure 406: *Adjusting a first thoracic PRS listing, using the superior hand.*

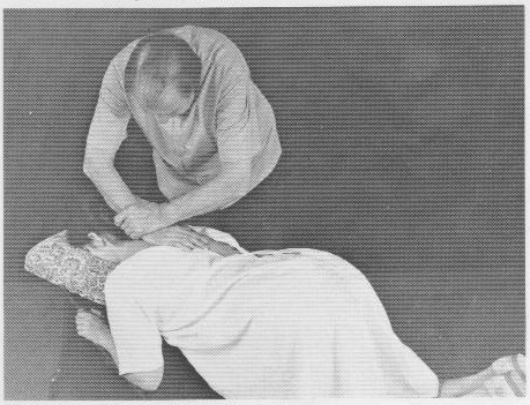


Figure 407: *Adjusting a first thoracic PRS listing, using the inferior hand.*

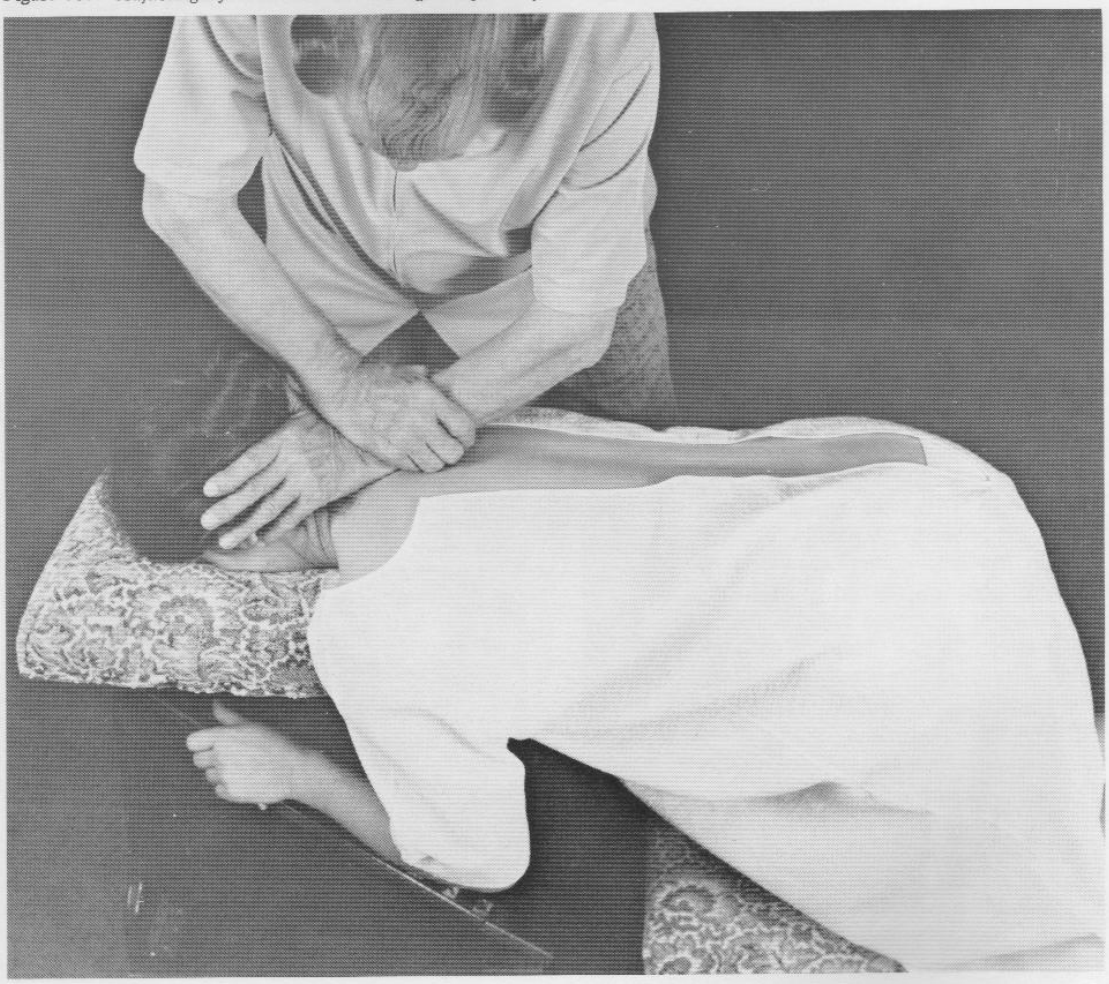


Figure 408: *Reaching over to the opposite transverse for a PRI-T first thoracic adjustment.*

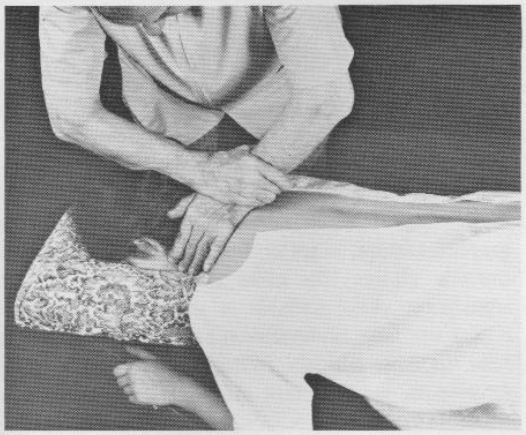
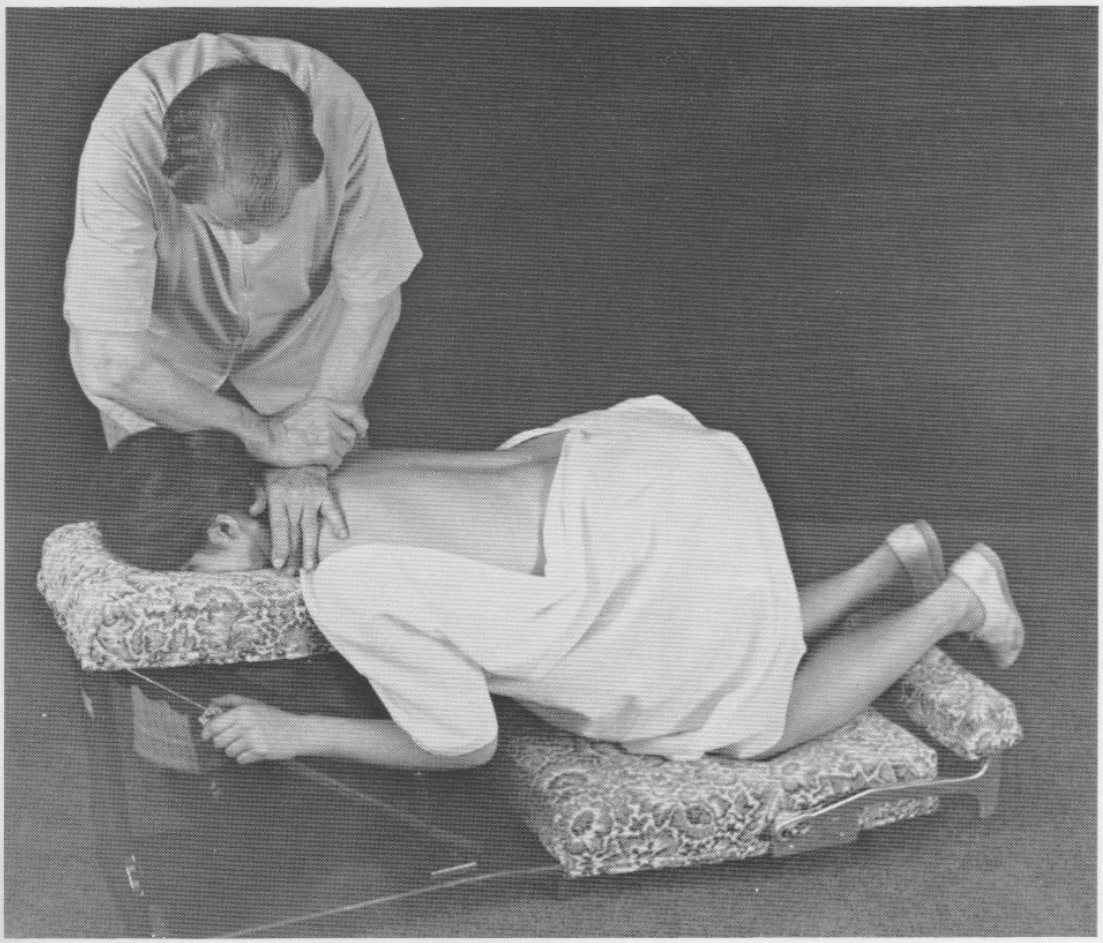


Figure 407 illustrates the inferior hand as the contact hand for a first thoracic PRS listing. The pisiform is placed on the spinous contact point, and the fingers cross the spine at about a forty-five degree angle. The doctor may adjust his stance according to the amount of inferiority required to thrust through the plane line of the disc. In figure 407, the amount of inferiority is slight, as indicated by the doctor's head position. The doctor may ask the patient to raise or lower his chin in order to find the head position where the neck and shoulder muscles are most relaxed. The slack should be reduced slowly and moderately, followed by a very quick and relatively deep thrust.

In figure 408, the doctor is reaching over the patient in order to contact the opposite transverse process. This represents a PRI-T, first thoracic sub-

Figure 409: *The doctor-patient setup for a PRI-T first thoracic listing.*



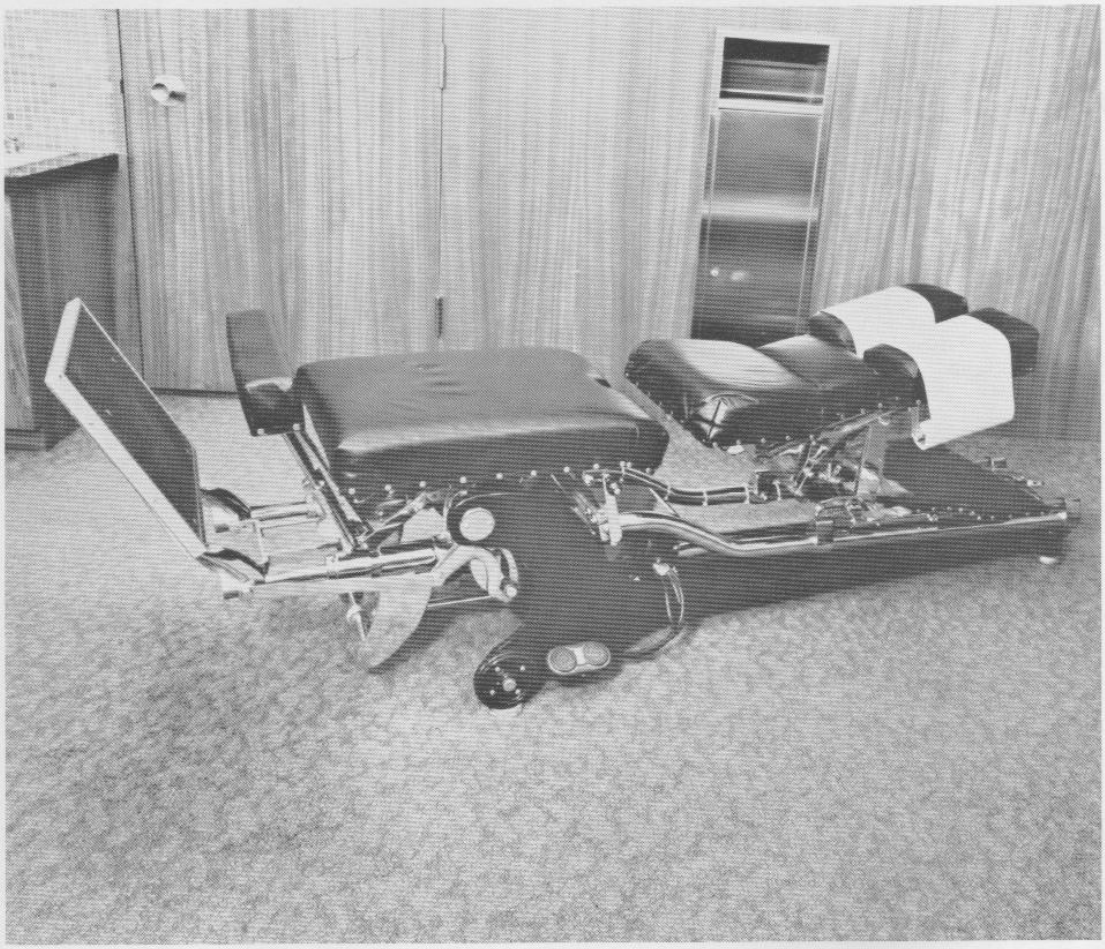
luxation, using the inferior hand as the contact hand. The fingers are on more of a ninety degree angle to the spine so that the pisiform more easily contacts the transverse process. The position of the doctor's body indicates that considerable inferiority is required in order to follow the plane line of the disc.

The doctor-patient setup for a PRI-T first thoracic subluxation, using the inferior hand as contact hand, is shown in figure 409.

The Zenith Hi-Lo Table with Gonstead Modifications

It was mentioned earlier that the thoracic vertebrae may be adjusted in the prone position, as well as on the knee-chest table. For all adjustments in the prone position, the table of choice is the Zenith Hi-Lo table. The table may be ordered with certain improvements, known as the "Gonstead Modifications", which allow for more efficient and effective handling and adjusting of the patient. These modifications include the following: A leather covering, which will outwear the standard Naugahyde, and minimize slipping of the patient when the thrust is given; a larger platform for the patient to stand on; longer handholds, to prevent the patient from accidentally lowering the head support section; a softer foam rubber in the upper thoracic section, for more comfort, and a deeper adjustment. Also available is an electric switch for raising the table, a convenient alternative to having to raise the table with the foot pedal. The Zenith Hi-Lo table, with the Gonstead modifications, is shown in figure 410.

Figure 410: *The Hi-Lo table with Gonstead modifications.*



Cervical Corrections C2 Through C7

Chapter 17

Gonstead Chiropractic Science & Healing Art

Chapter 17

Cervical Corrections C2 Through C7

Cervical Adjustments on The Knee-Chest Table

There are three different ways to position the patient for making an adjustment of the cervical spine. The most effective position is with the patient sitting in the Gonstead cervical chair. This position will usually allow a more specific contact, particularly on the smaller cervical vertebrae. There will be times, however, when the doctor may want to select an alternative position. The two other choices are either with the patient on the Gonstead knee-chest table, or in the prone position, such as on the Zenith Hi-Lo table. Either of these positions may be indicated if the patient will not relax sufficiently in the sitting position, or when a more P to A thrust is needed on the spinous process. There are also specific indications for the knee-chest table or prone positions. For example, an anteriorly rotated atlas is particularly amenable to an adjustment on the knee-chest table.

This section explains cervical adjusting with the patient on the knee-chest table. Because adjusting in the prone position is essentially the same as in the knee-chest position, prone adjusting will not be demonstrated.

The patient should be positioned on the knee-chest table so that the cervical spine is at the same level as the lumbar spine. This may require raising or lowering the chest support section, depending on the patient's stature, and the relative length of his torso and legs. If the chest support section is too low, the patient will want to extend his head, which will contract the posterior neck muscles. On the other hand, if the chest support section is too high, the cervical spine will be flexed, contracting the anterior muscles.

When adjusting the seventh cervical vertebra on the knee-chest table, the inferior hand will be the contact hand. The setup procedure is the same as when adjusting the first thoracic with the inferior hand (Ch. 16) except for some slight modifications in the doctor's stance for the various listings. The basic position for the doctor is directly opposite the seventh cervical vertebra, so that the thrust is made through the plane of the disc. The stance is altered, however, when the plane of the disc is directed superiorward or inferiorward, depending on the amount of cervical lordosis, and according to the seventh cervical listing. For a spinous contact, the doctor will stand on the side of spinous laterality. The superior hand is used to palpate and locate the seventh cervical spinous process. The pisiform of the contact hand is placed on the end of the spinous, and slightly superiorward or inferiorward if the listing requires it. For a C7 PRS listing, for example, the contact will be slightly superiorward on the spinous. Such a listing will usually indicate that the cervical spine is lordotic, and will require that the doctor stand superior to the contact point. A PRS-Inf. listing, on the other hand, indicates inferiority of the entire seventh cervical body. This will require that the doctor stand more inferiorward, so that the thrust is directed superiorward.

After the pisiform is positioned on the contact point, the stabilization hand is placed over the contact hand. The slack is then reduced gradually and

lightly with equal pressure from both arms, until a slight resistance is met. A quick, controlled thrust is then given through the plane of the disc, with a coordinated motion of body drop and arm extension. The thrust is directed P to A, medialward, and superiorward or inferiorward when indicated. Torque is applied to reduce lateral wedging.

Figure 411 illustrates the doctor-patient setup for a seventh cervical PRS listing. The doctor is standing slightly superior to the seventh cervical vertebra, directing the thrust inferiorward, medialward, and P to A, through the plane of the seventh cervical disc. Clockwise torque is applied to reduce the lateral wedging.

In figure 412, a PLS-Inf. contact is demonstrated on a skeletal specimen. The doctor stands slightly inferior to the seventh cervical vertebra so that the thrust is directed superiorward, medialward, and P to A, thereby reducing the inferiority of the entire vertebral body. Counterclockwise torque is used to reduce the wedging.

When adjusting a seventh cervical lamina listing, the doctor still stands on the side of spinous laterality. He must stand closer to the patient so that he can reach across to the opposite lamina. The inferior arm is supinated slightly so that the pisiform can contact the lamina. Otherwise, the palm of the hand will be too flat, and the thenar eminence will prevent the pisiform from contacting the lamina. Figure 413 illustrates the doctor-patient setup for a PRI-La listing. The direction of thrust is P to A, medialward, and with counterclockwise torque to reduce the lateral wedging.

The sixth cervical vertebra is adjusted on the knee-chest table in the same manner as the seventh cervical. The doctor stands opposite the contact point and uses the inferior hand as the contact hand. His stance must be corrected slightly to allow for superiority or inferiority of the plane of the disc. Before attempting to place the contact hand, the doctor must know whether C6 or C7 is VP. This information should be obtained from the lateral film. If C7 is VP, then the pisiform of the contact can be placed right on the end of the spinous process. When C6 is VP it is best to first put the pisiform on the spinous of C7, and then slide the contact superiorward, off the C7 spinous and onto the spinous of C6. This will prevent the contact from being placed too far superiorward, thereby missing the end of the spinous. This is especially important when the sixth cervical body is misaligned inferiorward, and/or when the spinous process of C6 is small. In figure 414, the doctor is in position for a C6 PRS listing. The direction of thrust is P to A, medialward, and slightly superiorward, following the plane of the disc. Torque would be applied in order to reduce the lateral wedging.

Figure 411: *Adjusting a seventh cervical PRS listing.*

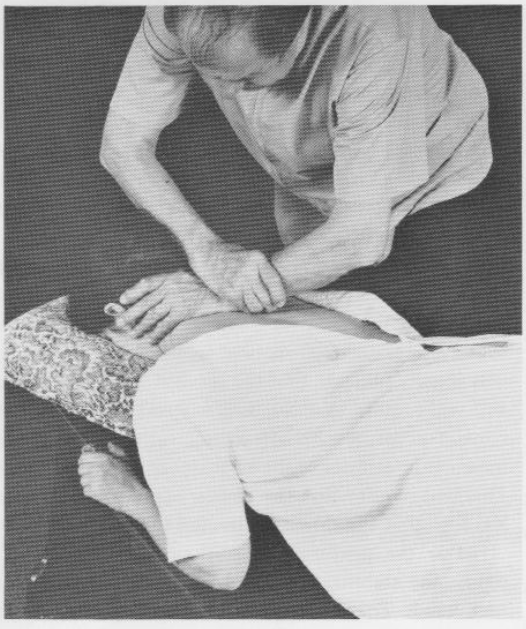


Figure 412: *Demonstrating a PLS-Inf seventh cervical adjustment.*

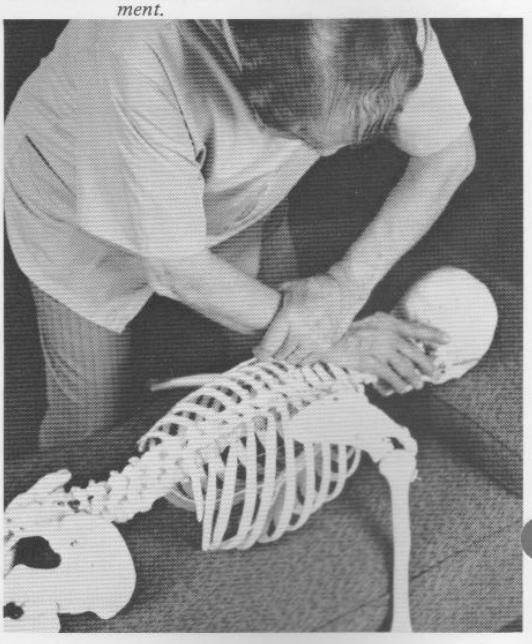


Figure 413: *Adjusting a seventh cervical PRI-La listing.*

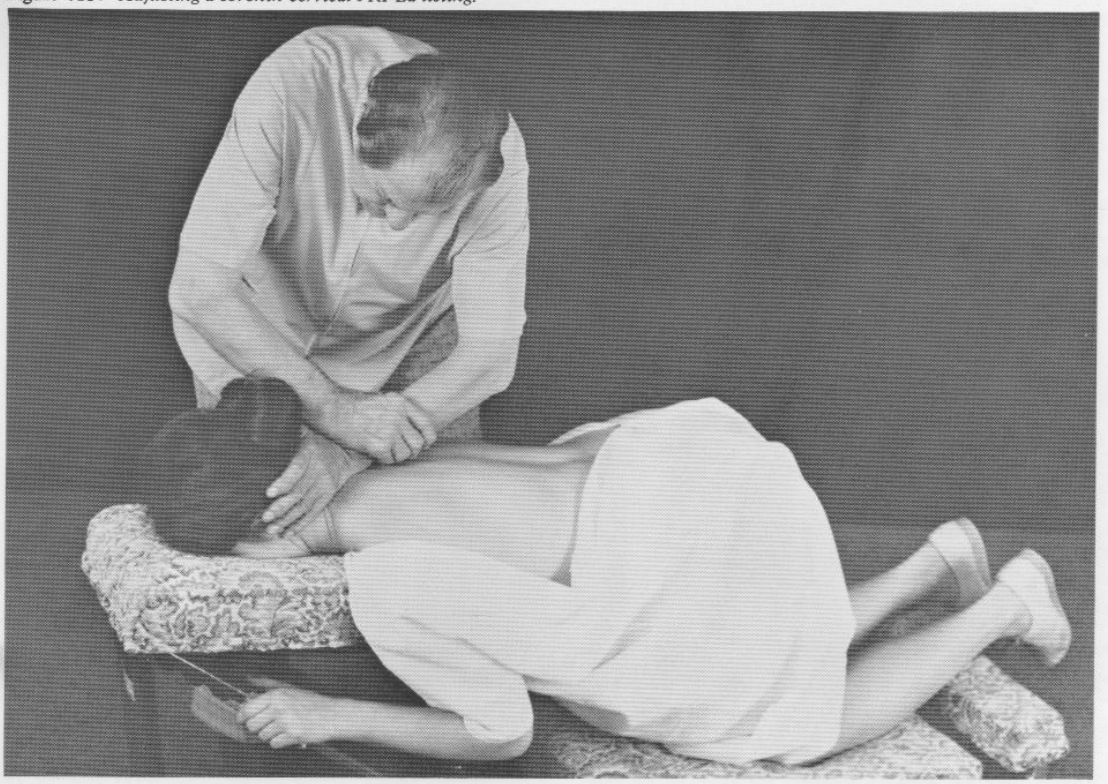


Figure 414: *Adjusting a sixth cervical PRS listing.*

Double Thumb Contacts

Because the spinous processes of cervicals three, four and five are relatively small and short, it is usually difficult to have a specific contact when the pisiform is used. The spinous or lamina is therefore contacted by the thumbs, similar to that described in the previous chapter under "Double Thumb Contact". For a spinous contact, the doctor should stand on the side of spinous laterality. He will adjust his stance according to the amount of cervical curvature, so that the thrust will follow the plane of the disc. The direction of thrust will also vary slightly according to which segment is being adjusted, the direction being more superiorward for a third cervical than for a fifth cervical. However, since most subluxated middle cervicals will usually demonstrate inferiority of the entire vertebral body, the doctor will stand inferior to the contact point in order to have sufficient inferior-to-superior line of drive. Once the doctor is properly positioned in relation to the patient's body, he should rotate his torso so that his shoulders

Figure 415: *Adjusting a C5 PRS-Inf listing with a double thumb contact.*

are parallel to the patient's. Either the right or left thumb may be used to contact the spinous process. Then the other thumb is placed over the nail of the contact thumb. The fingers of both hands grasp the anterior margins of the trapezius muscles (Fig. 415). After the slack is reduced, the thrust is made with equal pressure from both thumbs. The thrust must be very quick, and with the depth controlled. The direction is P to A, medialward, and inferiorward to superiorward. In figure 415, the doctor-patient setup is demonstrated for a PRS-Inf fifth cervical subluxation.

For a lamina contact, the doctor should stand on the opposite side of spinous laterality; that is, he will stand on the same side of the lamina to be adjusted. With the doctor turned so that his shoulders are parallel to those of the patient, he will place the thumb of his contact hand on the contact point. The right thumb will always contact the right lamina, as will the left thumb contact the left lamina. After the contact thumb is placed, the opposite thumb will be placed on the opposite lamina. This thumb is used strictly to stabilize the cervical spine. The thrust is made solely with the contact thumb. After the slack is reduced, a quick and controlled thrust is given through the lamina. Figure 416 illustrates the setup for a PLI-La-Inf third cervical listing. The thrust is given through the disc, in a P to A, medialward and superiorward direction. Clockwise torque is used to close the lateral wedging.

Figure 416: *Adjusting a PLI-La-Inf C3 listing with a double thumb contact.*

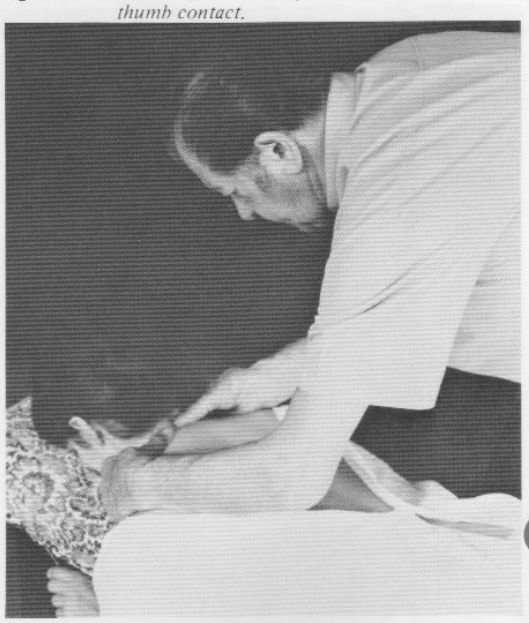
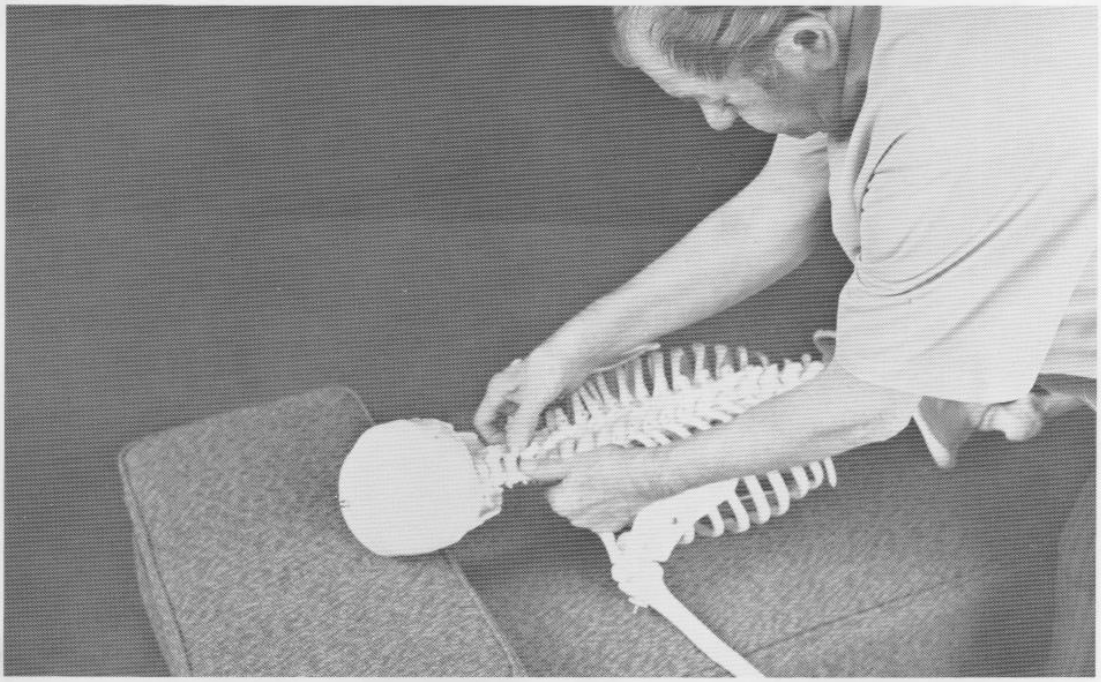


Figure 417: *Demonstrating a PLS-Inf C4 adjustment, with a double lamina contact.*



Double Lamina Contact

Occasionally it may be necessary or desirable to adjust a middle cervical that presents a spinous listing with a double thumb contact on the laminae. The spinous process may have been removed surgically, or it may be too small to contact even with the thumbs. Whatever the reason, the double lamina move offers a satisfactory alternative to the double thumb contact on the spinous process. The doctor should stand on the side of spinous laterality, and rotate his body so his shoulders are parallel to the patient's. His left thumb should contact the left lamina, while the right thumb contacts the right lamina. The thrust is made with equal pressure on both laminae simultaneously. Since the double lamina move does not have the same leverage advantage as does the spinous contact, the thrust must be very quick in order to overcome the inertia and the fixation of the vertebra. Figure 417 shows the doctor contacting the laminae of a skeletal specimen with a PLS-Inf fourth cervical listing. He is standing on the side of spinous laterality, and both thumbs are placed on the laminae. The direction of thrust is P to A, medialward, and inferiorward to superiorward. Torque is applied in a counterclockwise direction.

Adjusting The Axis

The knee-chest table is very suitable for adjusting an axis subluxation. The large spinous process makes it easy to contact with the pisiform, and the length of the spinous provides more than ample leverage for the thrust. For a spinous contact, the doctor should stand on the side of spinous laterality. Because of the length of the spinous, any amount of body rotation will displace the end of the spinous quite far laterally. The doctor will usually stand at about a forty-five degree angle to the patient's body, but this may have to be modified according to the amount of spinous laterality existing at the time of the adjustment. The doctor should first locate the spinous process with the inferior hand, and then place the pisiform of the superior hand on the contact point. The inferior hand should then be placed over the wrist of the contact hand to stabilize the thrust. The tissue slack should be reduced gradually so that the patient does not contract the cervical muscles in anticipation of the thrust. A very quick and deep thrust should be given, without any recoil motion. The direction of thrust should be P to A, medialward, and superiorward, the latter only when indicated. Torque must be used to reduce the wedging. Figure 418

presents a doctor-patient setup for a PRS-Inf axis listing. The doctor is standing quite inferior to the contact so that the thrust can be directed superiorward. The direction of thrust is P to A, medialward, and superiorward to inferiorward. Clockwise torque is applied at the end of the thrust. In figure 419, a PLS axis listing is demonstrated on a skeletal specimen. The doctor has shifted his weight so that the direction of thrust is less superiorward. The position of his body also suggests a subluxation with less spinous laterality.

Figure 418: *Adjusting a PRS-Inf axis.*

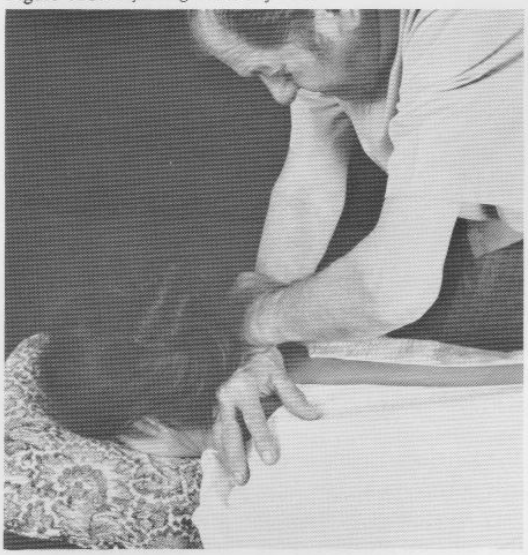
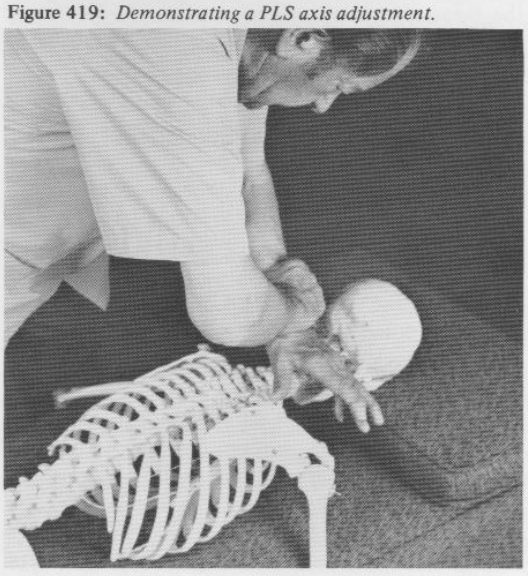
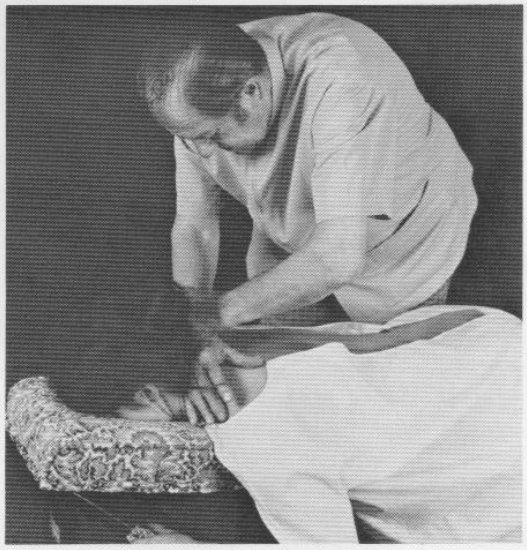


Figure 419: *Demonstrating a PLS axis adjustment.*



An axis lamina listing should be adjusted with the doctor standing on the side of spinous laterality. He must stand close to the patient so that he can reach across to the opposite lamina. The superior hand is used to contact the lamina, while the inferior hand stabilizes the thrust. In figure 420, a PRI-La listing is being demonstrated. The doctor is reaching over the patient to contact the left lamina. The direction of thrust is P to A, medialward, and very slightly superiorward, through the plane of the disc. Counterclockwise torque must be used to close the wedge.

Figure 420: *Adjusting a PRI-La axis listing.*



Cervical Adjustments on The Cervical Chair

The Gonstead cervical chair is utilized for adjusting all segments between the third thoracic and the condyle. This chapter will explain the procedures for adjusting C7 through C2. It will also include upper thoracic adjusting in the cervical chair, since this is very similar to adjusting the lower cervical segments.

The Gonstead cervical chair is illustrated in figure 421. It consists of a horizontal seat upon which the patient sits, and a vertical section that can be adjusted according to the height of the patient. The back section should be kept in the most vertical position

whenever possible, as this angle allows the patient to relax most readily. However, for taller patients, the back will have to be lowered, particularly when adjusting the upper segments, so that the doctor will not be reaching too high. To do so will cause tension in his arm and shoulder muscles, thereby making the thrust much less effective. The chair can also be ordered with legs of various lengths to accommodate the height of the doctor.

Each chair is also provided with a stabilization strap. The purpose of the strap is to secure the patient against the back of the chair, so that there is no forward motion of the patient's body when the P to A thrust is made. Otherwise, a much more forceful thrust would have to be used to compensate for this loss of stability. The stabilization strap is secured to the back of the chair on the left side with a snap-on fastener. The other end of the strap is secured with a Velcro fastener. When adjusting on the left side of the patient, as with a PLS or PR-La listing, the stabilization strap should be brought under the left arm, across the chest, and then over the right shoulder. Before the end of the strap is secured to the Velcro, it should be pulled downward slightly so that the right shoulder is brought inferiorward. If the right shoulder is elevated when making an adjustment from the left side, the thrust will not be effective. Figure 422 shows the correct position of the stabilization strap when adjusting from the left side of the patient (PLS, PR-La, etc.). Notice also that the patient has her hands in her lap, and that her legs are fully extended at the knees. The feet should not be placed under the chair, nor should they be placed so that the soles are flat on the floor. Instead, they should be resting on the heels as shown in figure 422.

Figure 423 shows the proper positioning of the patient for an adjustment on the right side (PRS, PL-La, etc.). The stabilization strap is brought over the patient's left shoulder, then across the chest, and under the right arm, before being fastened to the Velcro. The strap should be pulled inferiorward after it is brought over the left shoulder, so that the shoulder cannot be elevated when the adjustment is made. The hands should be held comfortably on the lap, as shown in figure 423. The arms should not hang at the sides of the chair, nor should they be folded across the chest. Both of these positions will produce contraction of muscles in the neck, and are not conducive to total body relaxation.

When adjusting the cervical vertebrae C2 through C7 on the cervical chair, the contact point on the vertebra will either be on the tip of the spinous pro-

Figure 421: *The Gonstead Cervical Chair.*

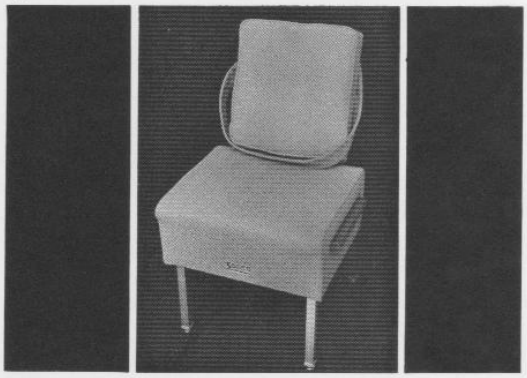


Figure 422: *The stabilization strap secures the right shoulder when adjusting from the left side.*

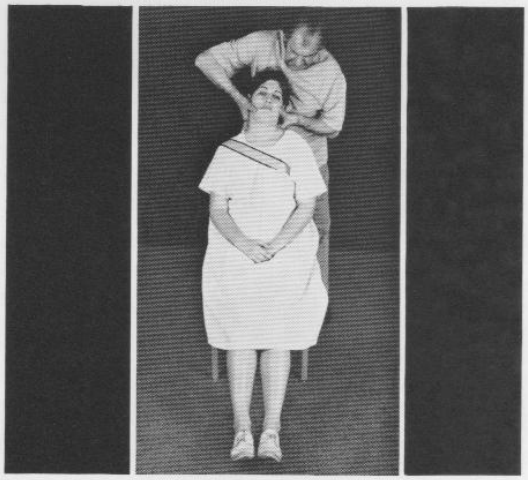
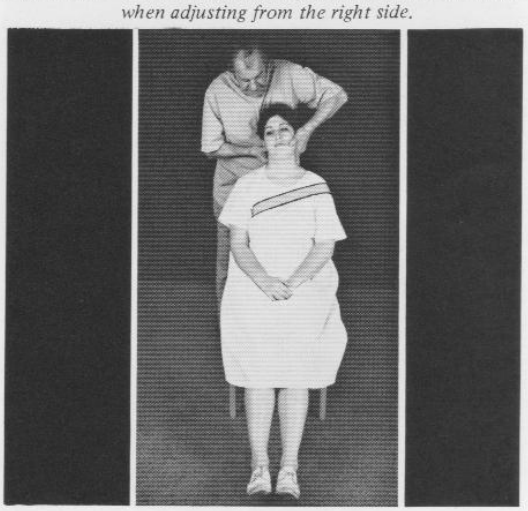


Figure 423: *The stabilization strap secures the left shoulder when adjusting from the right side.*



cess, or on the proper lamina as indicated by the listing. More specifically, a PRS-Inf listing will require contact on the inferior, right tip of the spinous, whereas a PLI-La listing should be contacted on the inferior portion of the right lamina. The contact hand for either of these listings will be the right hand, while for a PLS or PR-La listing, the left hand will be the contact hand. The vertebra is contacted with the palmar surface of the distal phalanx of the index finger, as shown in figure 424. The middle finger should be directly adjacent to the index finger to give the index finger stability, and both fingers should be slightly flexed as shown in figure 424. The contact hand is stabilized by placing the thumb on the ramus of the mandible, below the temporomandibular joint, so that no pressure is applied to the head of the mandible. In fact, the thumb merely guides the motion of the contact hand when the thrust is made, and very little pressure is applied by the thumb at all. When the contact hand is properly placed, an arch is formed by the lateral portion of the thumb and index finger. The proper placement of the contact hand, showing the arch formed by the thumb and index finger, and the position of the thumb on the mandible is shown in figure 425. The degree of arch will vary depending on which vertebra is being adjusted, there being a greater arch for a lower cervical, and less arch for an axis or third cervical adjustment.

Figure 424: *Where the vertebra is contacted.*

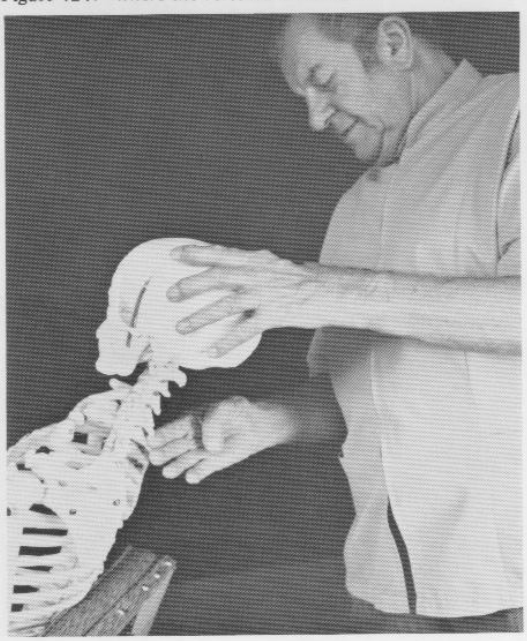


Figure 425: *Placement of the contact hand.*

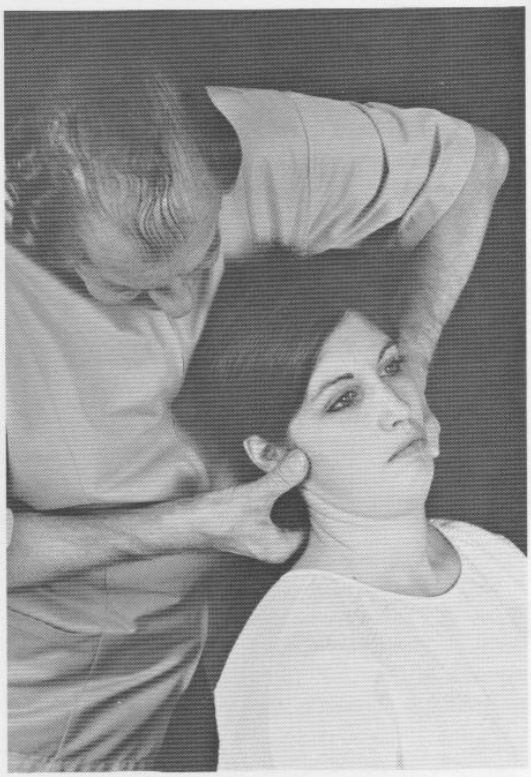


Figure 426: *The middle finger backs up the index finger, and the palmar surface of the hand is superiorward.*

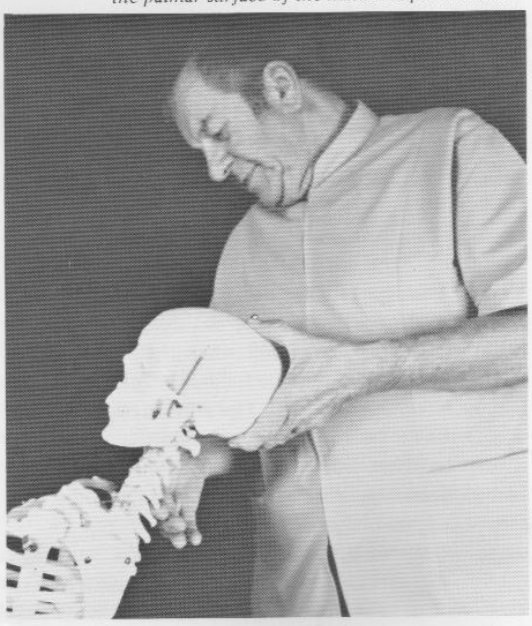


Figure 426 illustrates the contact hand in position on a skeletal specimen. The tip of the index finger is placed on the spinous process, while the middle finger backs it up for support. The fingers are slightly flexed, and the hand is turned with the palmar surface superiorward, so that the thumb can be placed on the ramus of the jaw.

The stabilization hand is placed so that the palmar surface supports the lateral area of the cervical spine, particularly supporting the vertebra being adjusted. This will bring the thenar eminence over the ear, and the thumb along the angle of the jaw, when a higher cervical is being adjusted, as shown in figure 427. For a lower cervical, the hand will be lowered so that the thenar is below the ear, and the thumb below the angle of the jaw. This is illustrated in figure 428. Both of these illustrations show that the fingers of the stabilization hand are wrapped around the posterior and lateral portions of the cervical spine.

When the doctor is in position to make a cervical adjustment, the forearm of the contact hand will be in a horizontal position, whereas the forearm of the stabilization hand will be much more vertical. This is well illustrated in figure 425.

When the patient is comfortably seated in the cervical chair, the doctor should begin by standing behind the patient, and slightly toward the side being contacted. With the stabilization hand on the top of the patient's head, the head should be flexed slightly so that the spinous processes are separated. The tip of the index finger of the contact hand should then be placed on the end of the spinous process of the segment below the one to be adjusted. Then the contact finger is moved up so that it fits under the spinous of the vertebra being adjusted, and slightly lateralward. If there is no inferiority of the subluxated vertebral body, then the contact finger may be placed slightly higher on the spinous. The thumb should then be placed on the ramus of the jaw so that the arch is formed between the thumb and the index finger. The head is then brought back into a more relaxed position by the stabilization hand, and the stabilization hand is placed properly along the posterior and lateral portion of the cervical spine. The chin is elevated slightly so that the anterior surfaces of the vertebral bodies are separated.

The neck is then flexed laterally about ten or fifteen degrees toward the side being adjusted. The head is also rotated slightly toward the same side. Flexing the head laterally allows the bodies to separate on the opposite side so that the vertebra will move without binding when the thrust is given. Rotating the head toward the side being adjusted helps to rotate the

Figure 427: *Placing the stabilization hand for a higher cervical.*

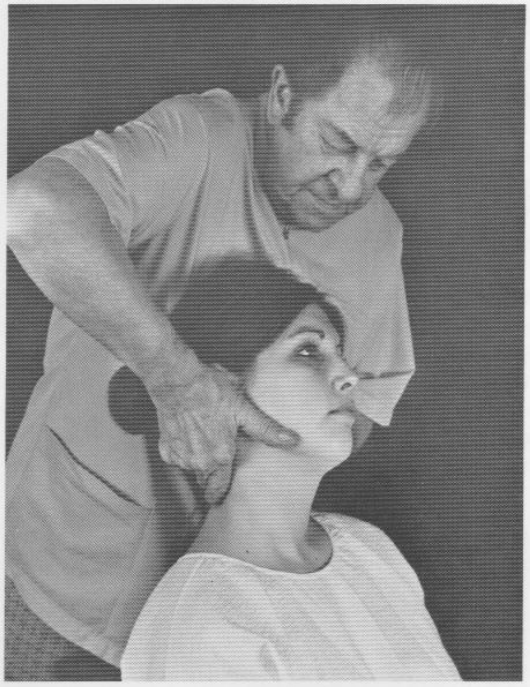
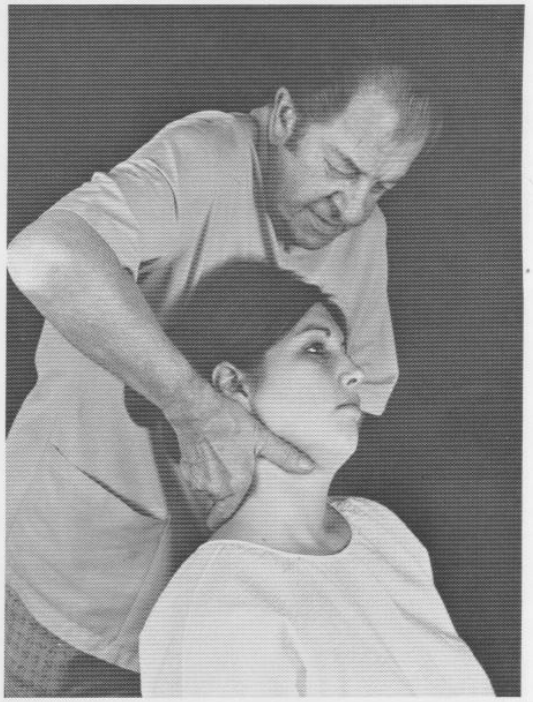


Figure 428: *Placing the stabilization hand for a lower cervical.*



subluxated vertebra toward the side it needs to go when it is corrected, that is, toward the opposite side. The slack is then reduced by applying pressure on the spinous process with the contact finger. There should be no increase in pressure with the thumb when the slack is reduced. The thrust is then made with the contact hand. It should be very quickly applied in order to overcome the resistance of the fixation. The direction of the thrust is anteriorward, superiorward (when inferiority is involved), and medialward.*

The thrust is made almost entirely with a rotational motion of the wrist and forearm, which lifts the spinous superiorward while at the same time moving it anteriorward and medialward. The same exact type of thrust is applied, whether it is a spinous or lamina listing. The function of the stabilization hand is to merely guide the motion of the head as the thrust is given. There is no pulling motion by the stabilization hand. The thrust will cause the head to rotate slightly to the opposite side in which it was rotated, so that the end of the thrust the head will face forward. Figure 429 shows a front view of the proper doctor-patient setup for a PRS-Inf sixth cervical subluxation. The head is turned slightly and flexed toward the side being adjusted. The position of the contact hand, with the placement of the thumb on the ramus of the jaw, is better seen in figure 430. The doctor is shown behind the patient, and slightly toward the side being adjusted. The position of the stabilization hand (for a PLS-Inf, PR-La-Inf, etc. listing) is illustrated in figure 431. The position of the fingers and thumb, as well as the angle of the forearm should be noted.

The setup for a higher cervical, the axis in this

**Torque should be applied when necessary to correct lateral wedging.*

Figure 429: *Adjusting a sixth cervical with a PRS-Inf listing.*

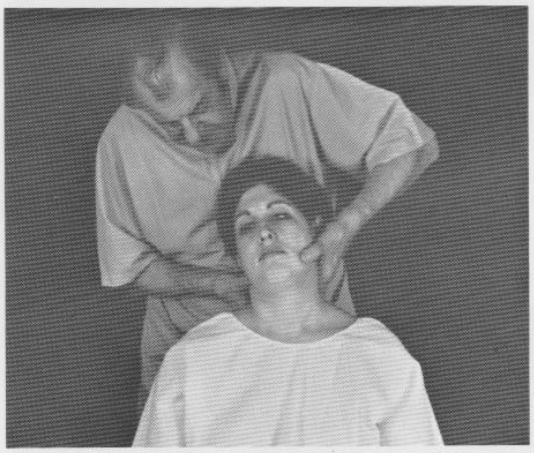


Figure 430: *The contact hand for a PRS-Inf sixth cervical listing.*

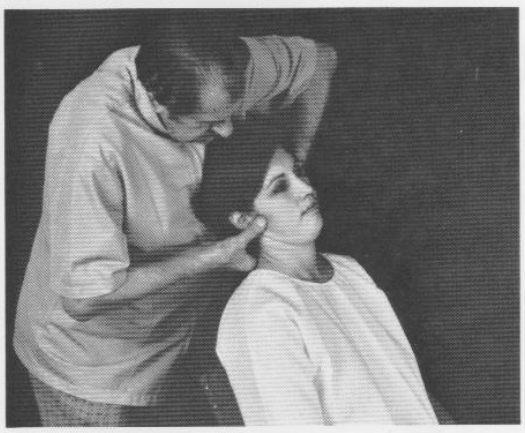


Figure 431: *The stabilization hand for a PLS-Inf sixth cervical listing.*

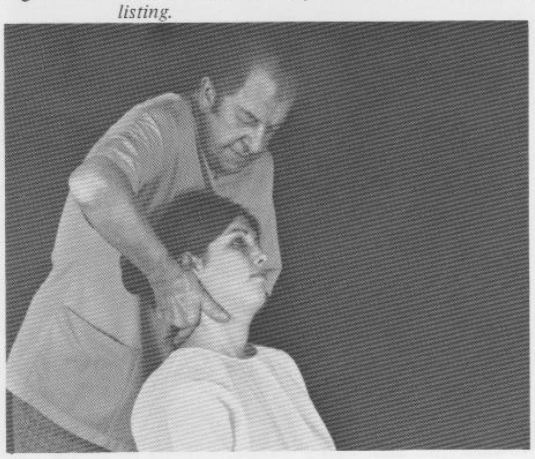
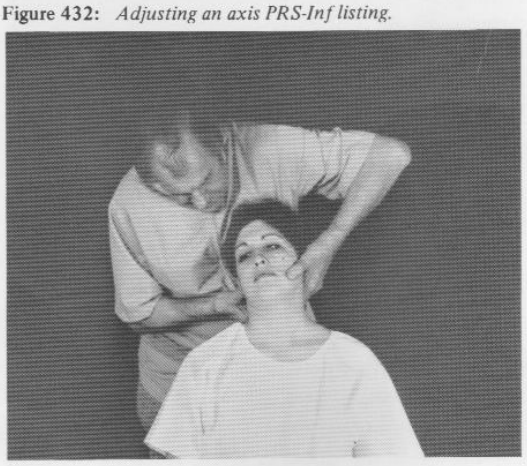


Figure 432: *Adjusting an axis PRS-Inf listing.*



case, is represented in figure 432. The chin should be elevated slightly higher when adjusting the axis. This photograph shows the head rotation and lateral flexion of the neck in preparation for the thrust. In figure 433, the position is shown at the termination of the thrust. The head rotation is reduced, and the forearm of the doctor's contact hand is in a more forward position. The position of the contact hand for an axis or high cervical is illustrated in figure 434. The stabilization hand, being placed higher on the neck for an axis subluxation, is shown in figure 435.

When the listing does not include inferiority of the vertebral body, such as with a PRS or PRI-La, for example, the chin should not be elevated as high as it would when inferiority is included. The thrust will be directed more inferiorward than it would otherwise. A front view of a seventh cervical PRS listing is illustrated in figure 436.

Figure 433: *The head position after the thrust.*

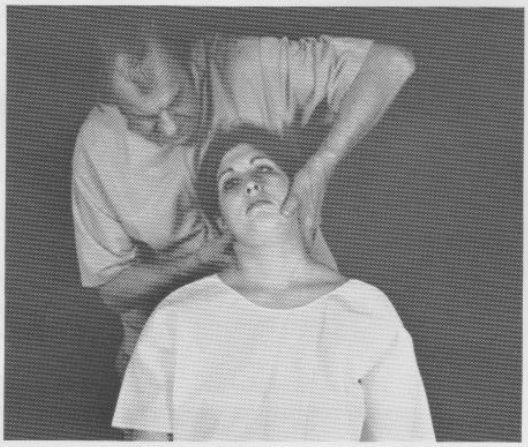
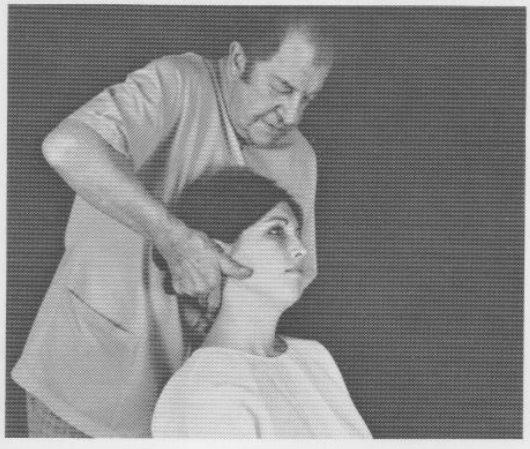


Figure 435: *The stabilization hand for an axis PLS listing.*



Thoracic Adjusting on The Cervical Chair

The upper thoracic vertebrae may also be adjusted using the cervical chair. How far down the spine the doctor will be able to adjust will be dictated by the length of his fingers, and the size of the patient. This is also governed somewhat by the skill of the doctor, and the quickness of his thrust. While it is feasible that with a small patient, and a doctor with large hands, a fourth thoracic could be adjusted, particularly if it is a transverse process contact, most doctors are comfortable with a second or third thoracic at best.

Figure 434: *The contact hand for an axis PRS listing.*

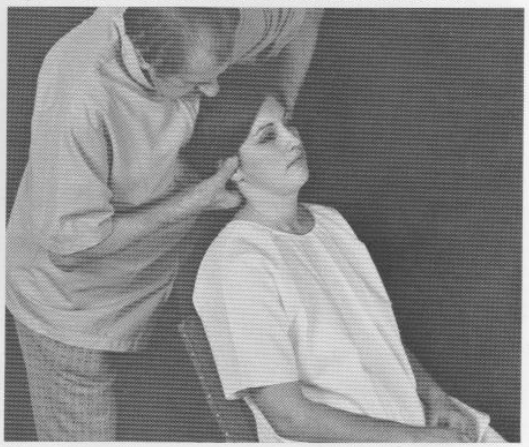
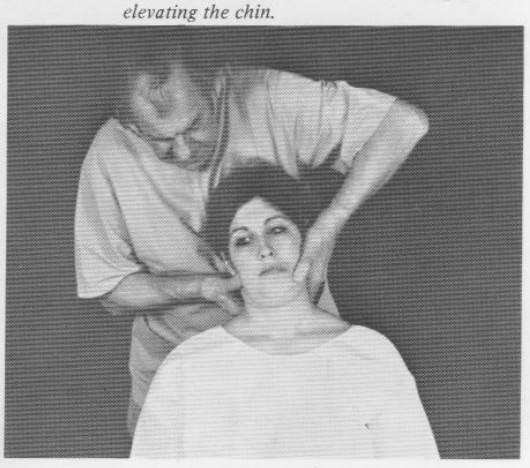


Figure 436: *Adjusting a seventh cervical PRS listing without elevating the chin.*



Everything that was said about adjusting the cervicals, with the exception of the placement of the hands, is the same for thoracic adjusting. Figure 437 illustrates the doctor-patient setup for a second thoracic PRS listing. Because the contact hand is lower, the thumb will be placed lower on the jaw. This insures that the arch remains between the thumb and index finger. Without the arch, the thrust will not be effective, since the hand will be too vertical, causing the contact to be along the lateral border of the index finger instead of on the tip of the distal phalanx.

Another way of insuring that the arch remains is to flex the head more lateralward, as shown in figure 438. It is also sometimes possible, as when adjusting a third or fourth thoracic, or when the doctor cannot otherwise reach the mandible, to anchor the thumb on the sternocleidomastoid muscle, as shown in figure 439.

The stabilization hand will also be placed lower than it would be when adjusting a cervical. The thenar eminance will be below the mastoid process, and the thumb will lie parallel along the sternocleidomastoid muscle. This is illustrated in figure 440.

In figure 441, the doctor-patient setup is shown for a PRI-T third thoracic subluxation.

Figure 437: *Adjusting a second thoracic PRS listing.*

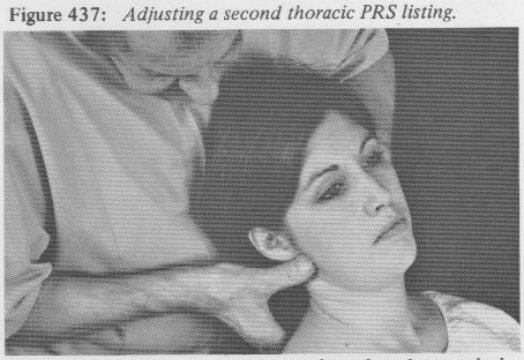


Figure 438: *Flexing the head more lateralward to reach the jaw with the thumb.*

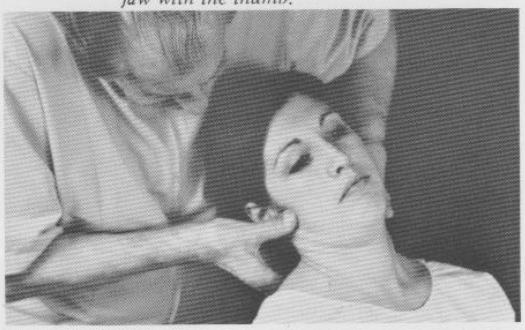


Figure 439: *Anchoring the thumb on the sternocleidomastoid muscle.*

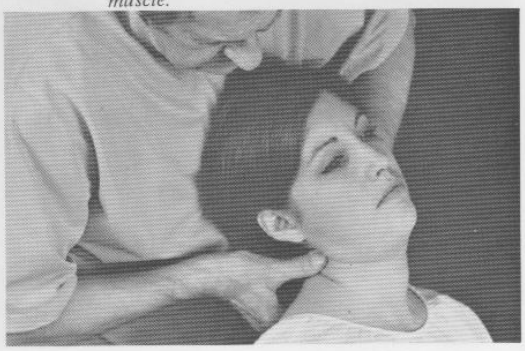


Figure 440: *Placement of the stabilization hand for a thoracic adjustment.*

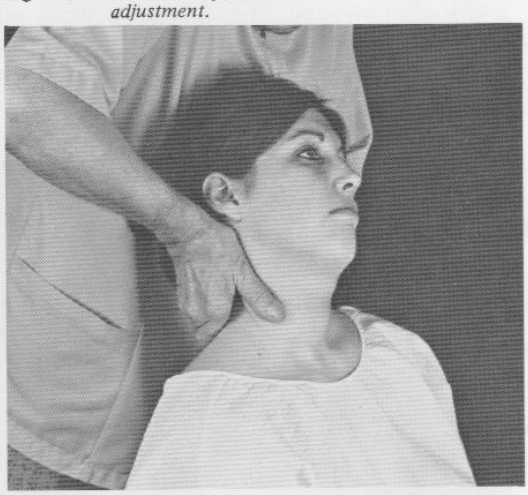


Figure 441: *The doctor-patient setup for a T3 PRI-T listing.*

Atlas and Occipital Condyle Corrections

Chapter 18

Gonstead Chiropractic Science & Healing Art

Chapter 18

Atlas and Occipital Condyle Corrections

Atlas Corrections

The most effective position for adjusting the atlas is with the patient sitting on the Gonstead cervical chair. This position allows the greatest amount of cervical muscle relaxation, and it also enables the doctor to position the patient's head in an exact and precise manner. In addition, a small and specific point on the vertebra is contacted with the tip of the thumb, thus allowing the vertebra in question to be moved in the intended direction.

The patient is positioned exactly the same as when a cervical below the atlas is being adjusted. The legs should be extended at the knees, and the feet should be resting on the heels. The arms and hands should be relaxed, and placed on the patient's lap. The stabilization strap should be used for all cervical adjustments on the cervical chair, and that includes atlas adjusting as well. When the atlas is being adjusted on the right side (ASR, etc.), the left shoulder should be secured inferiorward with the stabilization strap. Likewise, the right shoulder should be stabilized downward when adjusting the atlas on the left side (ASL, etc.).

The doctor should begin by standing behind the patient and slightly to the side being adjusted. If he is adjusting on the right side of the patient, as for an ASR atlas, the right hand will be the contact hand, and the left hand will be the stabilization hand. He should then flex the patient's head laterally, to the opposite side of the contact, and support the head in that position with the stabilization hand. This is done so that the mastoid process and atlas transverse process are discernible and easily palpated. Then, with the tips of the index and third fingers of the contact hand, the atlas transverse should be located and outlined. Once the doctor knows the exact location and extent of the atlas transverse process, he should place the distal phalanx of the thumb over the anterior and lateral portion of the transverse process. This is done as shown in figure 442. The hand is turned so that the palmar surface is superiorward, and the tip of the thumb is placed on the anterior and lateral surface of the transverse. The fingers of the contact hand are parallel and adjacent to one another, and slightly flexed. At this point, the head should be straightened so that the lateral flexion is removed. The doctor then brings the proximal phalanx of the thumb and the metacarpal of the index finger together, so that no space exists between them. In other words, there will be no arch between the thumb and index finger. This is illustrated in figure 443. This also brings the lateral surface of the index finger against the posterior cervical muscles, where it is placed lightly so that it stabilizes the contact hand. The stabilization hand is then placed so that the thenar eminence supports the mastoid process and atlas transverse process on the opposite side. This is illustrated in figure 444, which represents the placement of the stabilization hand for an ASL atlas. The fingers of the stabilization hand are wrapped around the back of the neck so that the entire head is supported.

With the stabilization hand, the doctor should

Figure 442: *The thumb is placed on the anterolateral border of the atlas transverse.*

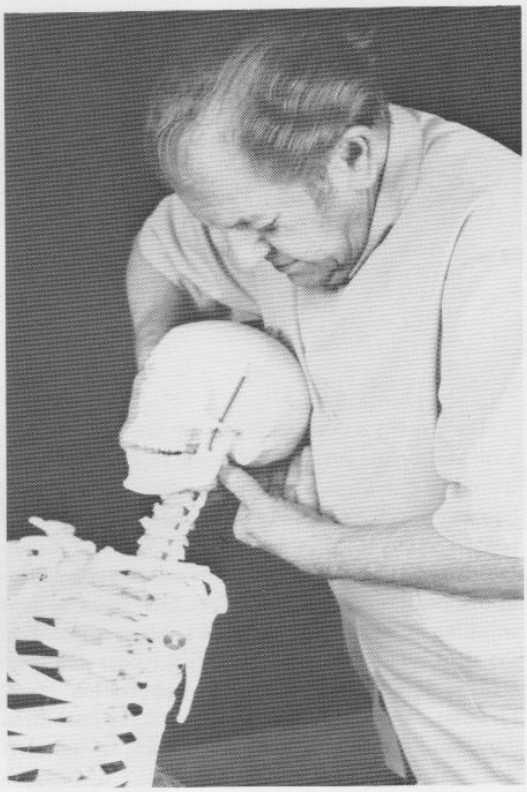


Figure 443: *There is no arch between the thumb and the index finger.*

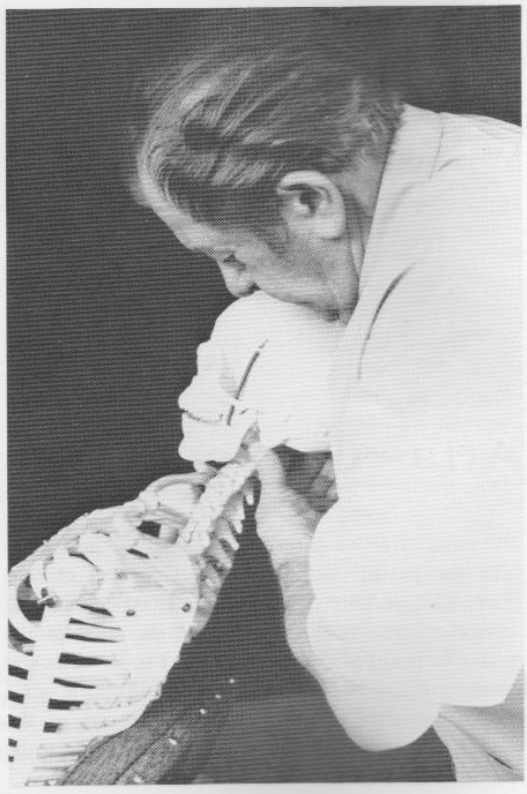
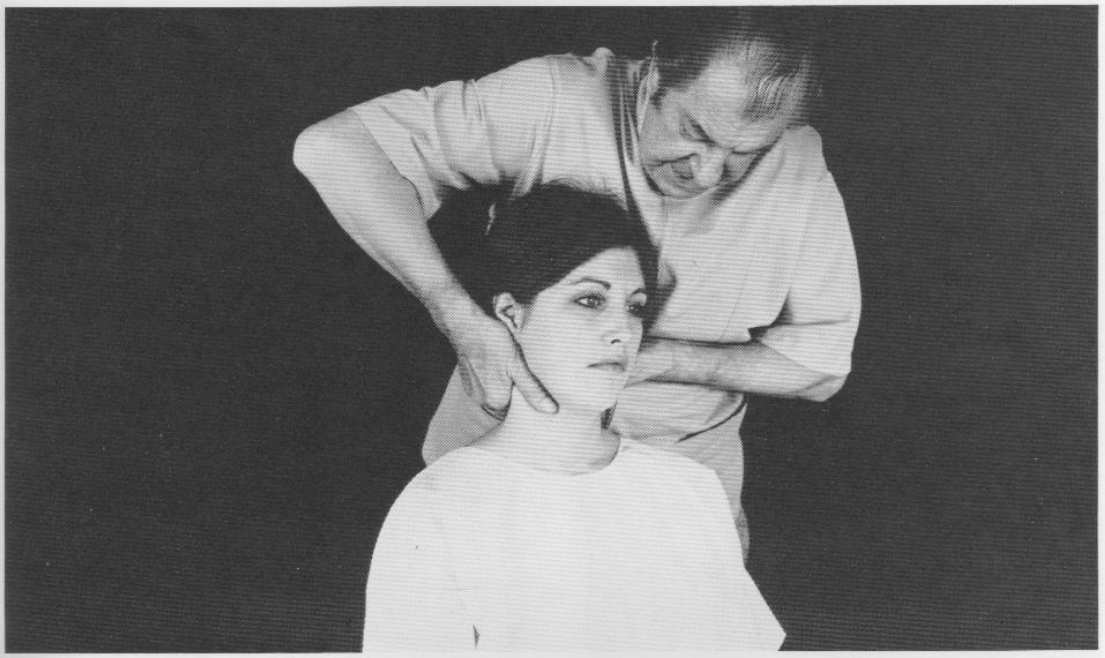


Figure 444: *Placement of the stabilization hand.*



slightly flex the patient's head toward the side of contact. This is done so that the space between the lateral mass of the atlas and the superior articular surface of the axis is separated, thus allowing room for the atlas to move. The doctor should then reduce the slack on the contact point with the tip of the thumb. This is done by applying pressure with the thumb only, in the direction in which the vertebra will move when adjusted. This direction will be almost entirely medialward, but also slightly posteriorward since every atlas subluxation involves some degree of anterior misalignment. But the main direction is directly medialward. For an ASL atlas adjustment, the direction will be medialward to the right, and for an ASR, medialward toward the left. The thrust should then be given, very quickly, in a medialward and slightly posteriorward direction. At the time of the thrust, there is no pulling motion by the stabilization hand. The stabilization hand merely supports the head, and guides the head motion created by the thrust.

Figure 445 illustrates the front view of the doctor-patient setup for an ASR or AIR atlas listing. The slight degree of lateral flexion of the head toward the patient's right side can be seen. There should be no rotation of the head toward either side. The angle

Figure 445: *The doctor-patient setup for an ASR or AIR atlas.*

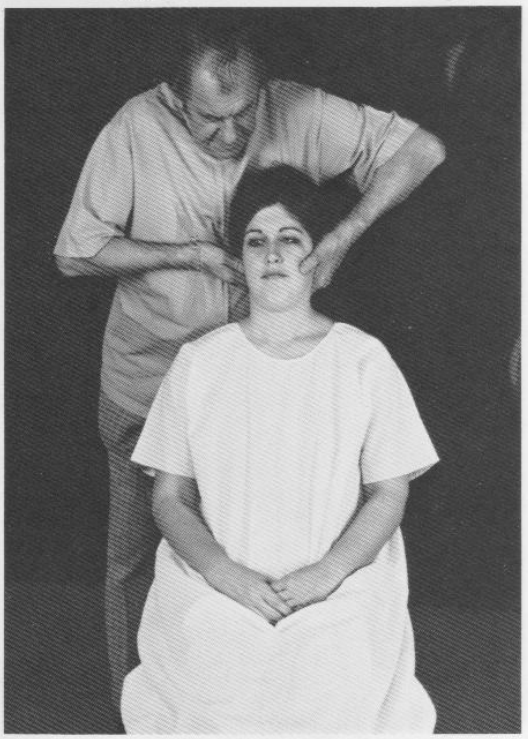


Figure 446: *ASR – The thrust is medialward, slightly posteriorward, and with clockwise torque.*

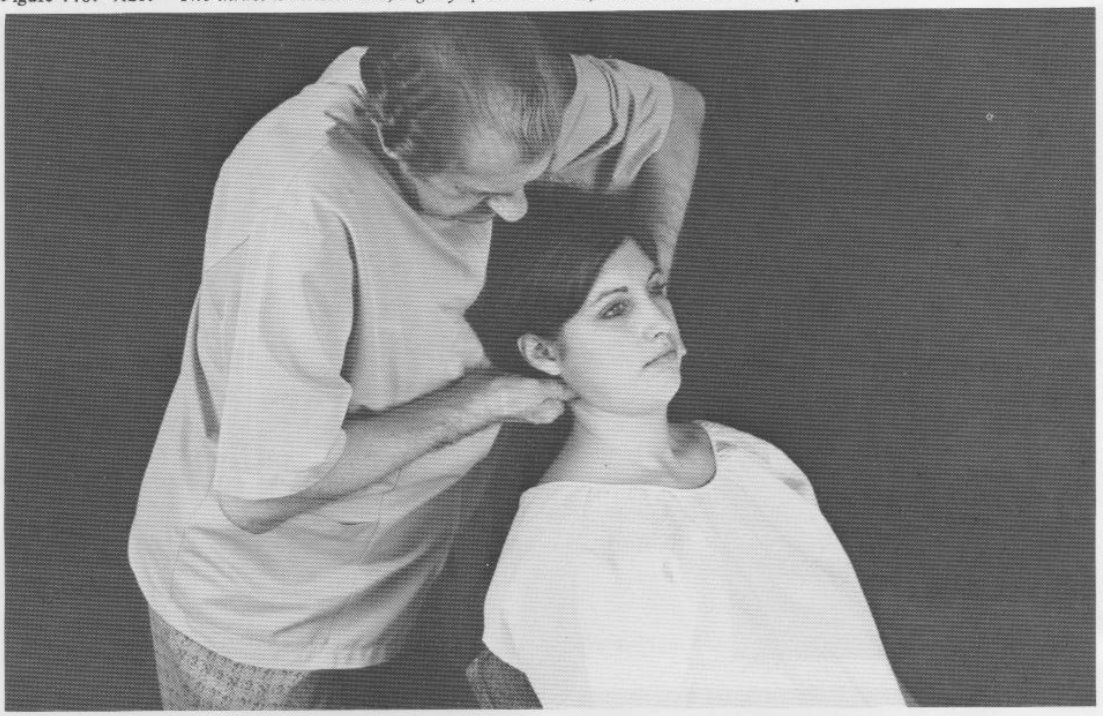


Figure 447: *The chin is down for an atlas with much superiority.*

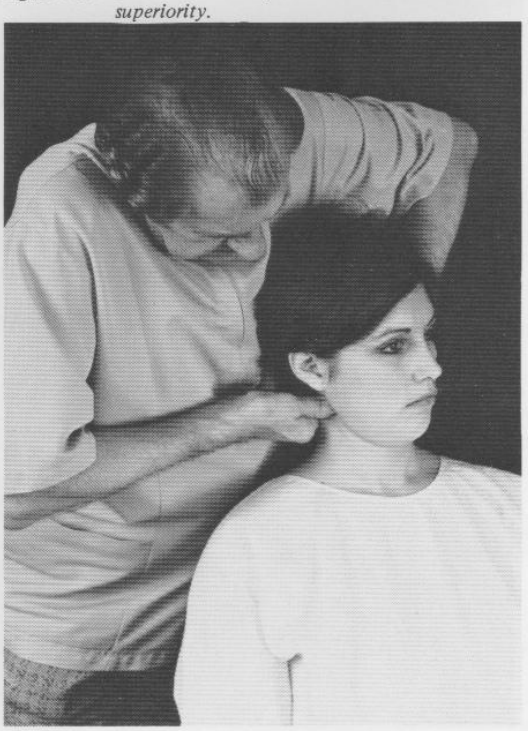


Figure 448: *The chin is elevated for an AIR atlas listing.*

of the forearm of the doctor's contact hand represents the direction of thrust. The angle of the stabilization hand, which supports the head, should also be noted.

The ASR adjustment is represented from the lateral view in figure 446. The head is flexed slightly toward the right, and there is no rotation of the head. The contact hand is in position, with the tip of the thumb on the anterior and lateral portion of the transverse process. Notice that no arch exists between the thumb and index finger. The thrust is given from right to left, and slightly posteriorward. Torque will be applied at the end of the thrust by the tip of the thumb in a clockwise direction. Figure 446 represents the patient's head position for a typical ASR atlas listing. Since most atlas subluxations involve a slight amount of "superiority" in the direction of misalignment, as determined by the lateral x-ray, the chin elevation is usually moderate for the typical listing. The degree of torque necessary to correct the superiority is also usually quite moderate. However, sometimes a great amount of superiority is present, in which case the elevation of the chin will have to be decreased. Figure 447 illustrates the amount of chin elevation for an atlas with a greater amount of superiority. When this is the case, the amount of torque applied by the thumb must be increased.

When an atlas subluxation involves "inferiority" in the direction of misalignment instead of superiority, the elevation of the chin must be increased. It's all a matter of degree; the greater the amount of inferiority, the greater the chin elevation. Figure 448 illustrates the head position and degree of chin elevation of a typical AIR atlas listing. Torque must be applied in a counterclockwise direction, in order to correct the inferiority. Figure 449 shows the front view of the doctor-patient setup for an AIR atlas subluxation.

In addition to lateral, anterior, and superior or inferior misalignment, the atlas may also misalign in a rotational direction. That is, the lateral mass in question may rotate either anteriorward or posteriorward, as indicated by the fourth letter of the listing. Rotational misalignment is corrected by rotating the patient's head in the direction opposite that to which the lateral mass rotates. In other words, if the listing is ASRP, it indicates that the right lateral mass has rotated posteriorward. The head must be rotated so that the lateral mass goes anteriorward, when the correction is made. Figure 450 illustrates the doctor-patient setup for an ASRP adjustment. The head is rotated away from the side of contact when a posterior rotational misalignment exists. That is, for an ASRP listing, the head is rotated to the left side. For an ASLP listing, the head will be rotated to the right side.

After the head is rotated to the left side when an ASRP atlas is being adjusted, the thrust is delivered exactly the same as when there is no head rotation; that is, it's the same thrust as for an ASR listing. The direction is still medialward, and slightly posteriorward, with torque applied in a clockwise direction in order to correct the superiority.

Figure 449: *The doctor-patient setup for an AIR atlas listing.*

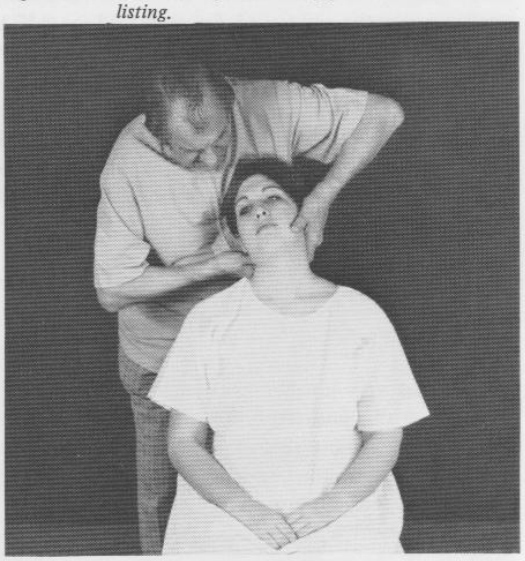


Figure 450: *Adjusting the ASRP atlas.*

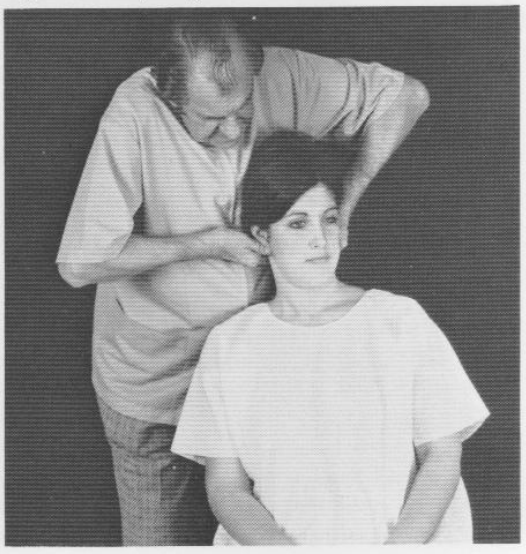


Figure 451 shows the lateral view for an ASRP adjustment. Notice that the head is rotated to the left side, as necessary, in order to correct the posterior rotational misalignment, and that the chin is down, so that the superiority will be corrected.

For an anterior rotational misalignment, the head must be rotated toward the side of contact. This rotates the lateral mass posteriorward on the side of laterality. When the thrust is given, therefore, the lateral mass will be moved medialward and posteriorward, onto the superior articular process of the axis. For an ASRA or AIRA listing, the head will be rotated toward the right, and for an ASLA or AILA listing, the head rotation will be to the left.

Figure 452 represents the setup for an AIRA atlas listing. Notice that the chin is elevated, and that the head is turned toward the side of laterality. This listing is also shown from the lateral view in figure 453.

Atlas Adjusting on The Knee-Chest Table

The atlas may also be adjusted on the knee-chest table. While this position may not allow as specific a contact on the transverse process, since the pisiform is used instead of the tip of the thumb, it still provides a very effective means of adjusting the atlas. Once the patient is in the usual position on the knee-chest table, he turns his head toward the side of laterality, that is, toward the side being contacted. The hand and arm on the side being contacted is then positioned as shown in figure 454. This lessens the inferiorward pull of the shoulder on that side, and allows more relaxation of the sternocleidomastoid and other muscles of the neck. The hand on the opposite side remains down on the handhold of the table, in the usual manner. The doctor then palpates the atlas transverse process with the inferior hand, which will be the stabilization hand. Once the anterior and lateral surface of the transverse process is located, the doctor places his thumb on the specific point to be contacted (Fig. 455). The doctor then places the pisiform of the superior hand over the tip of the thumb, so that the pisiform is directly over the contact point, and the thumb is removed (Fig. 456). The stabilization hand is then placed over the wrist of the contact hand as shown in figure 457. Before the thrust is given, the doctor should adjust the angle of his forearm so that the forearm will be in a direct

Figure 451: *ASRP – the chin is down to correct the superiority.*

Figure 452: *Adjusting the AIRA atlas.*

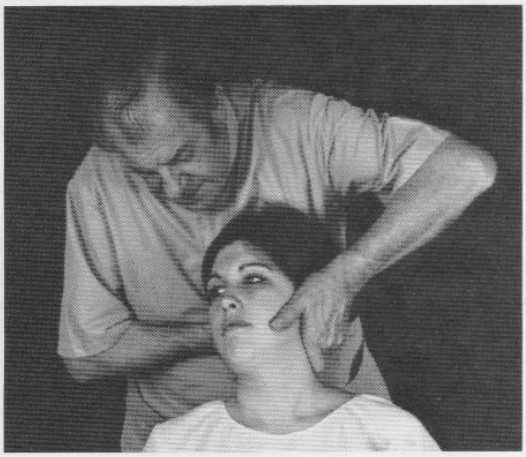


Figure 453: *The chin is elevated for an AIRA listing.*

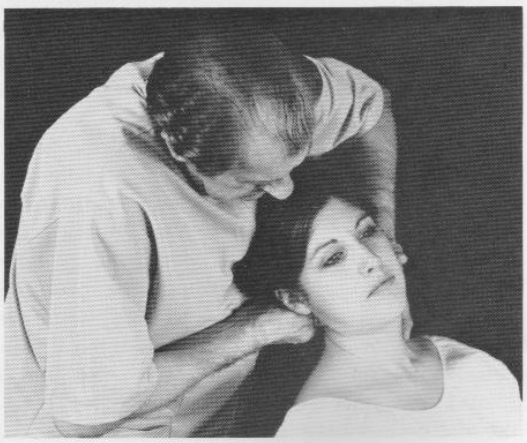


Figure 454: *The head is turned toward the side of laterality, and the hand rests on the headpiece.*

Figure 455: *The thumb is placed on the atlas transverse.*

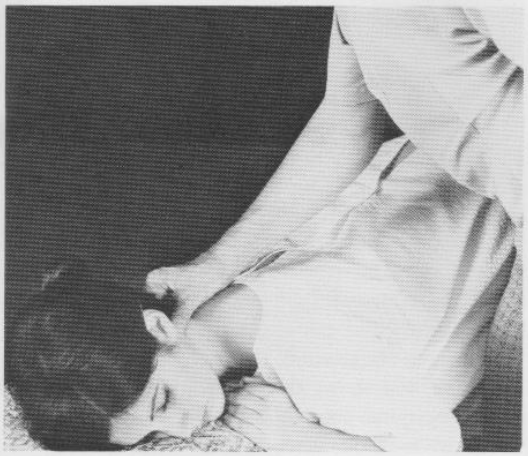
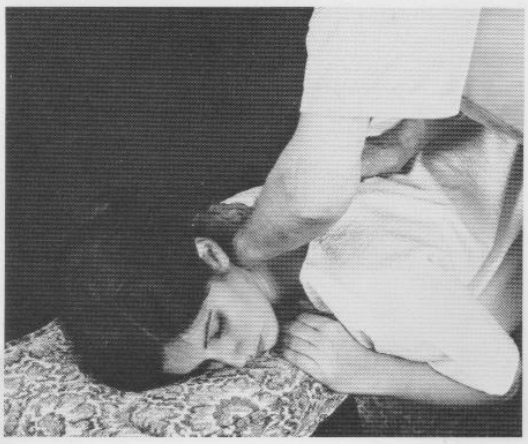


Figure 456: *The pisiform is placed on the contact point.*



line with the direction of thrust. The slack is reduced by applying gentle pressure with the pisiform in the direction of the thrust. The thrust is made quickly and deeply in a medialward and slightly anteriorward direction, and torque is applied to correct for inferiority or superiority. When rotational misalignment is a part of the listing, the doctor will vary his stance so that the direction of thrust will direct the atlas transverse process more posteriorward or anteriorward. In figure 457 the doctor is standing away from the patient so that the thrust drives the lateral mass posteriorward. This is the setup for adjusting an ASLA or AILA atlas on the knee-chest table. In figure 458, the doctor is standing further over the patient. The thrust will drive the lateral mass more anteriorward, which will correct an ASLP or AILP atlas listing.

Figure 457: *The setup for an ASLA or AILA atlas listing.*

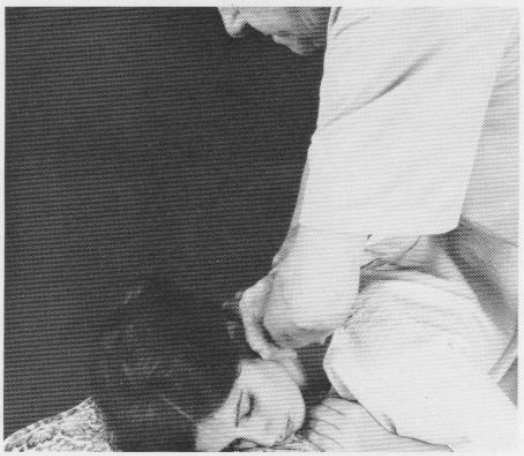
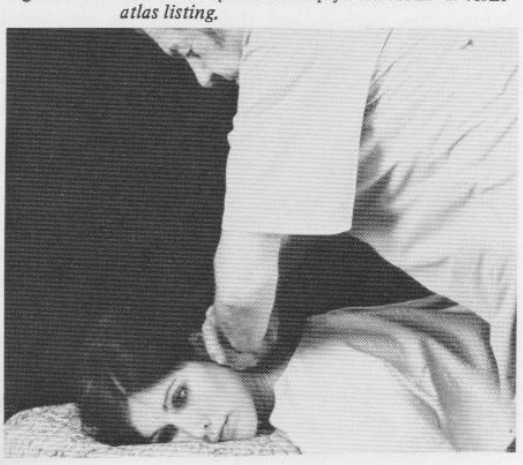
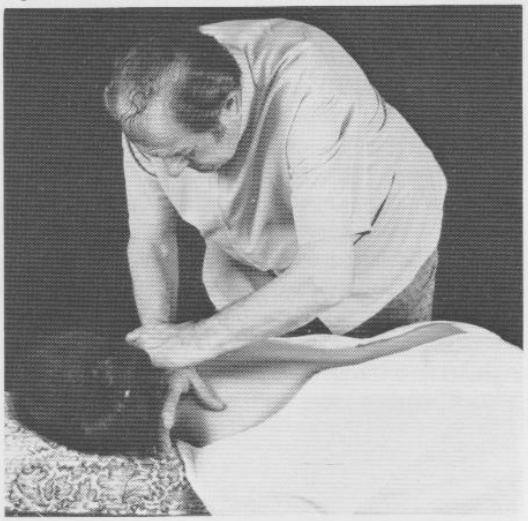


Figure 458: *The doctor-patient setup for an ASLP or AILP atlas listing.*



The doctor-patient setup for an ASRP or AIRP atlas listing is shown in figure 459. Notice that the doctor is leaning quite far over the patient so that the thrust directs the lateral mass anteriorward.

Figure 459: *The setup for an ASRP or AIRP listing.*



Occipital Condyle Corrections

All "PS" occipital condyle misalignments should be adjusted with the patient sitting in the cervical chair. "AS" occipital condyle misalignments may either be corrected in the cervical chair, or with the patient in the supine position on the pelvic table.

For PS condyle listings, the doctor should stand behind the patient, and slightly to the side being adjusted; that is, to the side of laterality as designated by the "RS" or "LS" portion of the listing. For a PS-RS listing, the right hand will be the contact hand, and the left hand will be the stabilization hand. When PS-LS is the listing, the doctor will use the left hand as the contact hand, and the right hand as the stabilization hand. The preferred contact point is directly over the external ear. The ear is contacted with the thenar eminence as shown in figure 460. The hand is placed so that it fits comfortably over the ear, with the thumb on the mandible, and the fingers cupped around the inferior occiput. An alternative contact point, one used when there is a greater amount of PS misalignment in the listing, is behind the ear, above the mastoid process. When the hand is placed, the helix will be folded forward, ahead of the thenar eminence. This will bring the thumb behind the angle of the jaw as shown in figure 461. There is yet another contact point that may be used when the laterality portion of the listing is dominant. This is illustrated in figure 462, and shows the contact hand in the exact same position as when adjusting an atlas. However, the tip of the thumb is placed in the external acoustic meatus, directly behind the tragus. This enables the thrust to be directed almost entirely medialward. Since most condyle listings involve some degree of PS misalignment, as well as laterality, however, the condyle will usually be adjusted with the thenar eminence over the ear as shown in figure 460.

The stabilization hand is also placed with the thenar eminence over the ear, although somewhat higher than the contact hand. This is illustrated in figure 463. The palm and fingers of the stabilization hand are wrapped around the back of the neck, where they support the base of the skull. As shown in figure 463, the plane of the forearm of the contact hand is nearly horizontal, while the forearm of the stabilization hand is more vertical.

After the contact and stabilization hands are placed, the doctor flexes the patient's head slightly to the side of laterality. This separates .the medial space between the fixed condyle and the lateral mass so that movement can occur. The slack is then reduced in the direction of thrust, which is medialward, anteriorward, and inferiorward. The thrust is given quickly and sharply in order to overcome the resistance of the fixation.

Figure 464 shows the doctor-patient setup for a PS-RS occipital condyle adjustment. The direction of thrust is medialward, anteriorward, and inferiorward.

When rotational misalignment is a part of the occipital condyle listing, it will be designated by a third set of letters, either "RA" or "RP" for a right laterality subluxation, or as "LA" or "LP" for a left laterality subluxation. Rotation of the condyle is corrected the same way as rotation of the atlas. When the condyle is rotated posteriorward on the side of laterality, as with a PS-RS-RP or PS-LS-LP listing, the head is rotated to the opposite side of laterality when the correction is made. Conversely, when the condyle is rotated anteriorward on the side of laterality, as with a PS-RS-RA or PS-LS-LA listing, the head is rotated toward the side of laterality when the correction is made. The direction of thrust is given precisely the same as when no rotation exists, namely, through the plane of the fixed condyle in a

medialward, anteriorward and inferiorward direction.

Figure 465 illustrates the doctor-patient setup for a PS-RS-RP listing. The head is rotated away from the side of laterality, or to the left side. In figure 466, the doctor-patient setup for a PS-RS-RA listing is shown. In order to correct the anterior rotation of the right condyle, the head is rotated to the right side, but the thrust is still directed medialward, anteriorward and inferiorward.

Just as the degree of superiority or inferiority in an atlas subluxation will vary, so will the degree of superiority vary in a PS condyle subluxation. Also, there will be various degrees of RS or LS in the listing, and different amounts of rotational misalignment. These variations will require changes in the head position when the adjustment is made. For example, in figure 467, a PS-RS-RP listing is repre-

Figure 460: *The contact for most occipital condyle listings.*

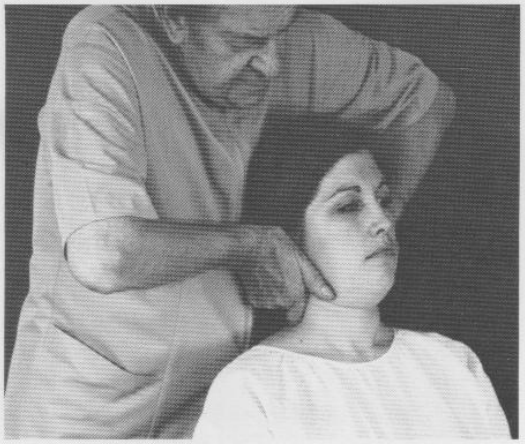


Figure 461: *Behind the ear contact for more P to A direction of thrust.*

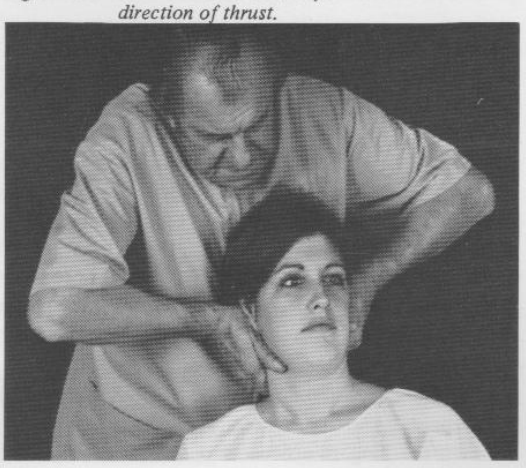


Figure 462: *The thumb placed in the ear for more medialward thrust.*

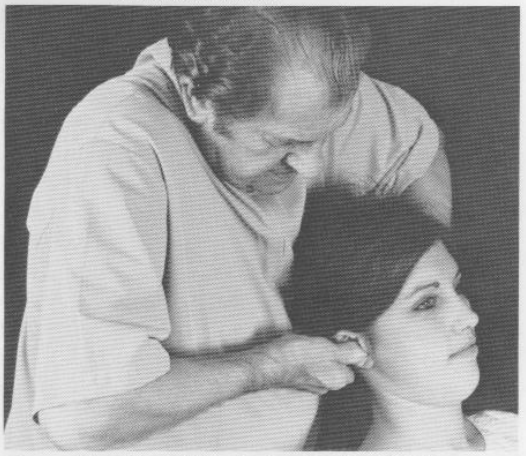


Figure 463: *The stabilization hand is placed higher over the ear.*

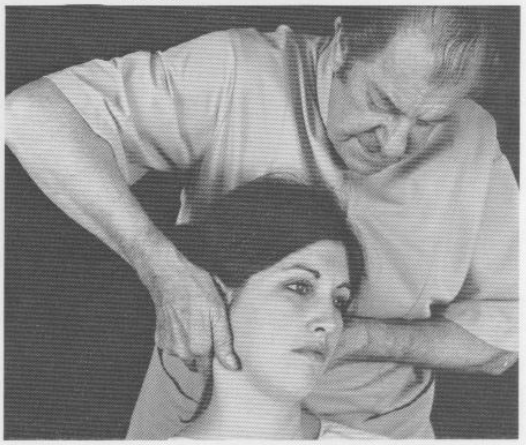
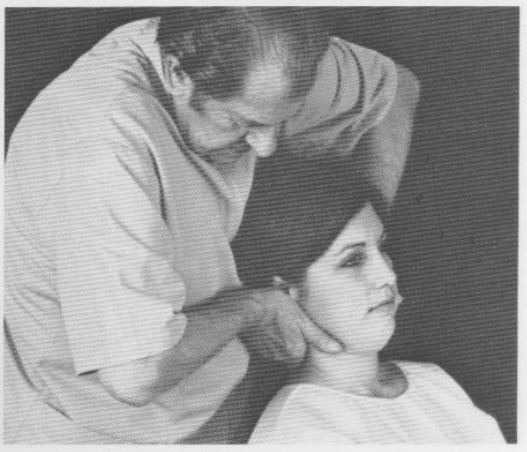


Figure 464: *The setup for a PS-RS occipital condyle.*



sented. The patient's chin is down, indicating only a slight amount of PS superiority, and the head is flexed only slightly to the right, indicating a moderate amount of RS superiority. In addition, the head is only rotated slightly to the left, indicating just moderate rotation of the condyle. But the direction of thrust is still medialward, anteriorward, and superiorward, the degree being dictated by the position of the head, and not by any change in the thrust. On the other hand, figure 468 shows a PS-RS-RA listing, in which the chin is elevated, the head is flexed far to the right, and the head shows a lot of rotation to the right. This indicates that the PS superiority is greater, as are the RS superiority and the rotational misalignment. Nevertheless, the plane of the doctor's forearm indicates that the direction of thrust is the same as in figure 467.

Figure 465: *The setup for a PS-RS-RP condyle listing.*

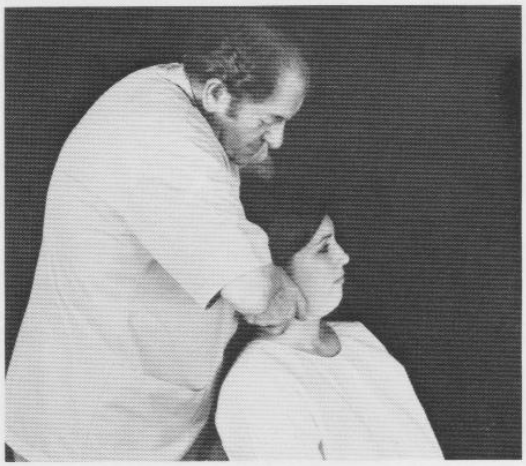


Figure 466: *The setup for a PS-RS-RA condyle listing.*

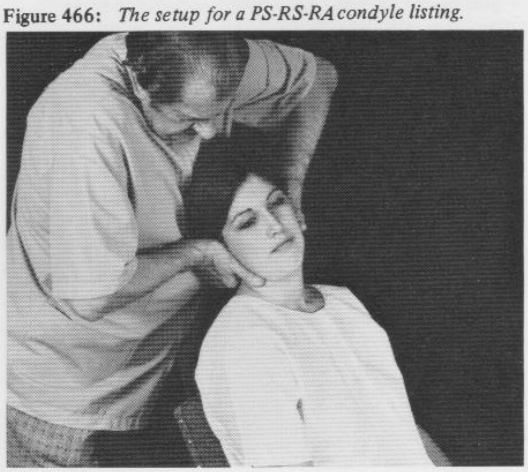


Figure 467: *PS-RS-RP – The head position indicates moderate degrees of misalignment.*

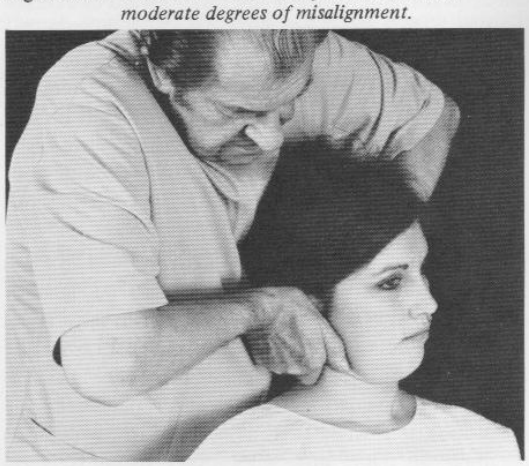
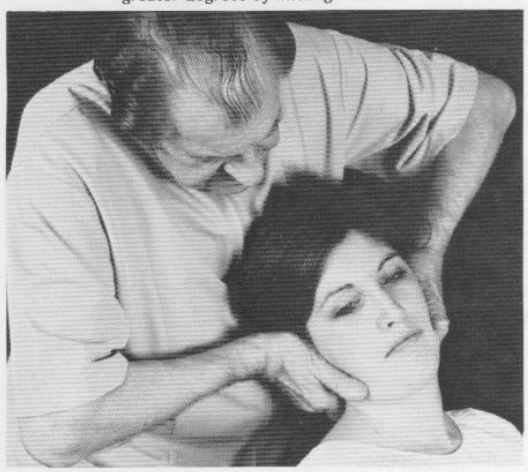


Figure 468: *PS-RS-RA – The head position indicates greater degrees of misalignment.*



Adjusting The "AS" Condyle

The "AS", or anterior condyle is adjusted with the patient sitting in the cervical chair in the usual manner, or on the pelvic table in the supine position. When the cervical chair is used, the doctor should stand directly behind the patient. The contact hand will be the hand on the side of laterality, and it is placed on the forehead so that the fifth metacarpal head is over the supra-orbital margin, in line with the glabella. The stabilization hand is placed in the same manner over the opposite supra-orbital margin, so that the fingers are overlapped (Fig. 469). The

Figure 469: *The contact for an AS-RS condyle misalignment.*

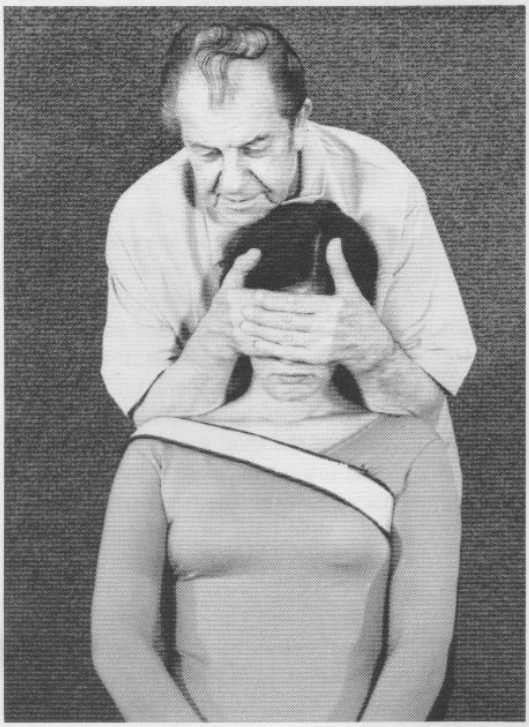
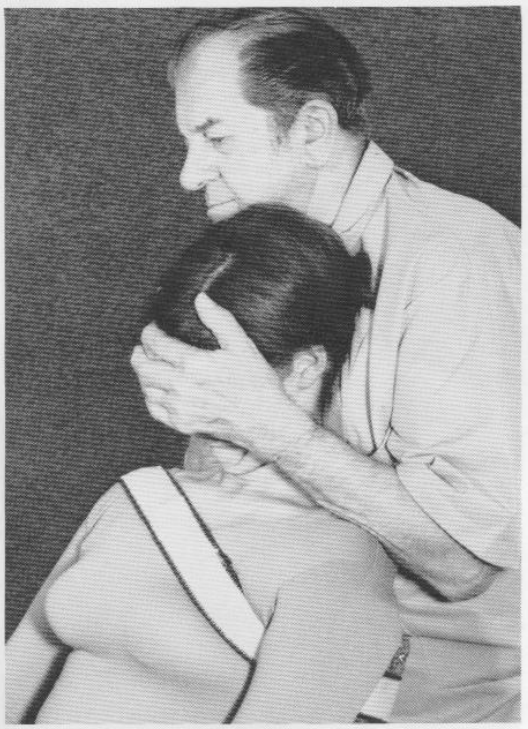


Figure 470: *Adjusting the AS-RS occipital condyle.*



head is flexed toward the chest until the point of tension is reached, and the back of the skull is stabilized against the doctor's chest. The slack is reduced in the direction of thrust, and the thrust is given quickly through the plane of the fixed condyle. For an AS-RS listing, the direction of thrust is posteriorward, inferiorward, and from right to left.

Figure 469 shows the doctor-patient setup for an AS-RS occipital condyle adjustment. The same listing is represented in a side view in figure 470. The direction of thrust is portrayed by the angle of the doctor's forearm. When rotational misalignment is part of the AS condyle listing, the adjustment is made by rotating the head, just as when adjusting the PS condyle. For an AS-RS-RP listing, the head is rotated to the opposite side of laterality; that is, to the left side. For an AS-LS-LP listing, the head will be rotated to the right side. The doctor-patient setup for an AS-RS-RP adjustment is shown in figure 471. The head is rotated to the left side, in order to correct the posterior rotation of the right condyle. As was the case with the PS condyle adjustment, the rotation of the head does not change the direction of thrust. It is still given in a posteriorward, inferiorward, and right to left direction.

Figure 471: *Adjusting the AS-RS-RP occipital condyle. The head is turned to the opposite side of laterality.*

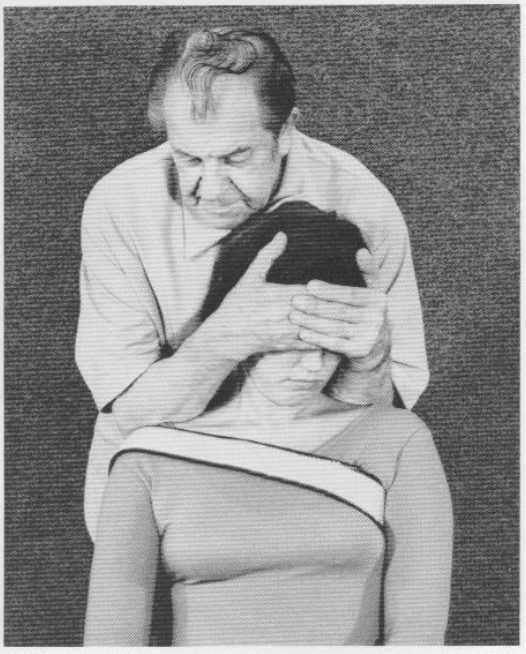
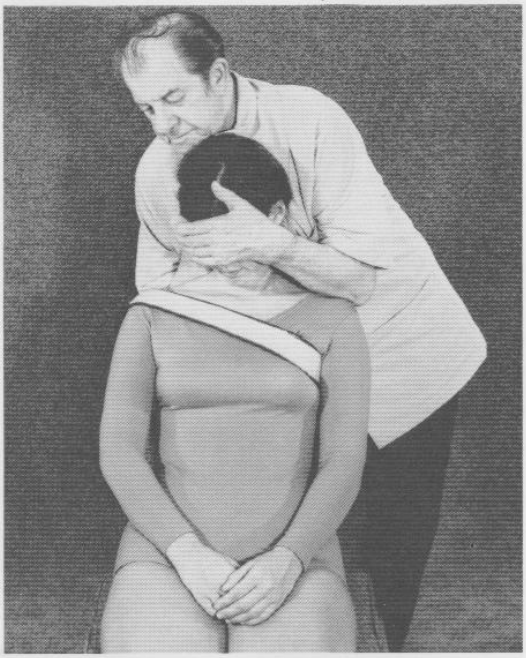


Figure 472 illustrates the doctor-patient setup for an AS-RS-RA listing. The head is rotated to the right side, the side of laterality. As usual, the direction of thrust remains the same, posteriorward, inferiorward, and from right to left.

Figure 472: *Adjusting the AS-RS-RA listing. The head is turned toward the side of laterality.*

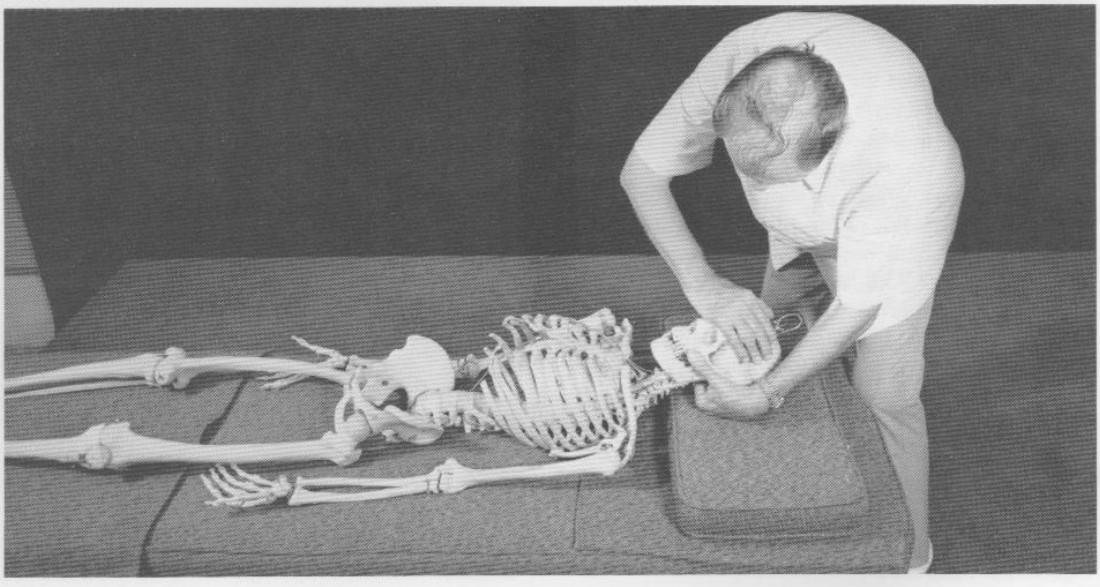


Adjusting The "AS" Condyle In The Supine Position

An alternative method for adjusting the AS condyle is with the patient in the supine position on the pelvic table. Something firm such as a telephone book should be placed under the patient's head to support the occiput. The doctor will stand behind the patient, and slightly to the side of laterality. The inferior hand will be the contact hand, and the superior hand will be the stabilization hand. The pisiform of the contact hand is placed over the glabella, and the fingers extend across the patient's forehead to the opposite side of laterality. The stabilization hand then reaches under the patient's skull and lifts the back of the skull superiorward, so that the head is flexed toward the chest. The base of the skull is then placed back on the firm surface for support. The slack is then reduced in the direction of thrust, which is posteriorward, inferiorward, and medialward. The thrust is given quickly through the plane of the fixed condyle.

Figure 473 illustrates an AS-RS occipital condyle adjustment on a skeletal specimen. The pisiform of the contact hand is placed over the glabella, and the thrust is given in a posterior, inferior and medial direction. When rotational misalignment is a part of the listing, the head must be rotated to the appropriate side in the usual manner.

Figure 473: *Demonstrating the AS-RS condyle adjustment while in the supine position.*



Adjusting Infants

Chapter 19

Gonstead Chiropractic Science & Healing Art

Chapter 19

Adjusting Infants

This chapter deals with the analysis and adjusting procedures used for those patients who are too young to radiograph, namely, babies and infants under two years of age. All the regular means of analysis are used, including observation, static and motion palpation, and instrumentation, with the exception of the x-ray. It is usually recommended that one of the parents accompany the doctor, not only to comfort the child and alleviate any fears he may have, but to also assist in the procedures.

Analysis Procedures

The baby should first be observed from the front while sitting in the parent's lap, as shown in figure 474. The legs should be able to hang freely over the parent's knees. Any abnormal internal or external rotation of the femur may be observed, which could indicate pelvic misalignment. The child shown in figure 474 is seen to have internal rotation of the left femur, which may indicate an Ex ilium on the left, or an In ilium on the right.

Figure 474: *The baby is observed while sitting on the parent's lap.*

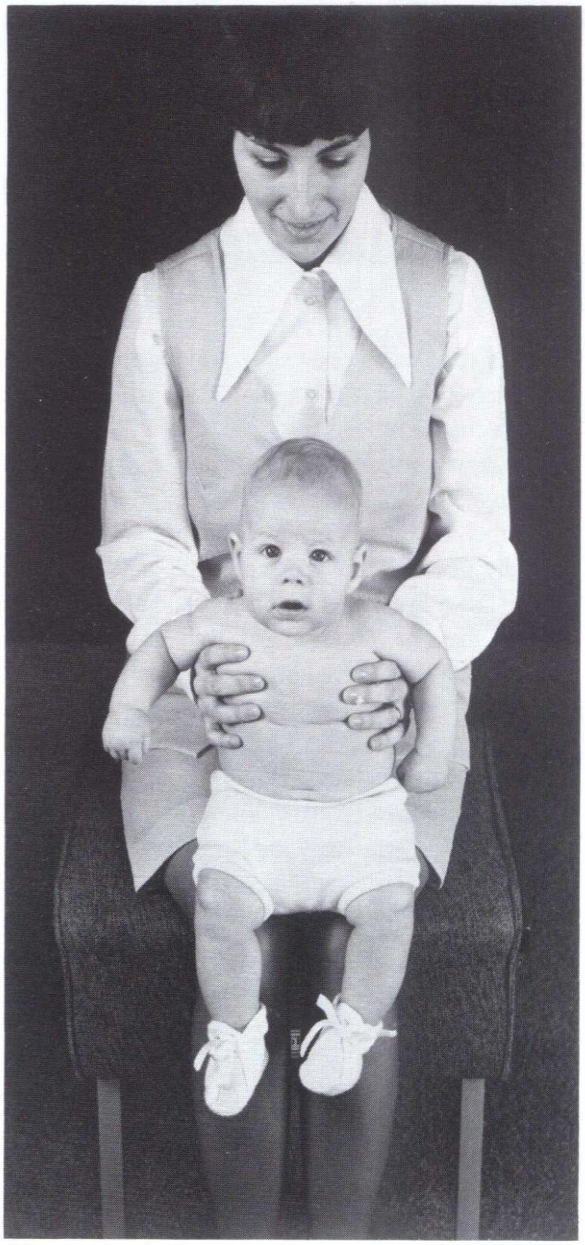


Figure 475: *Pelvic rotation is evident with the baby in this position.*

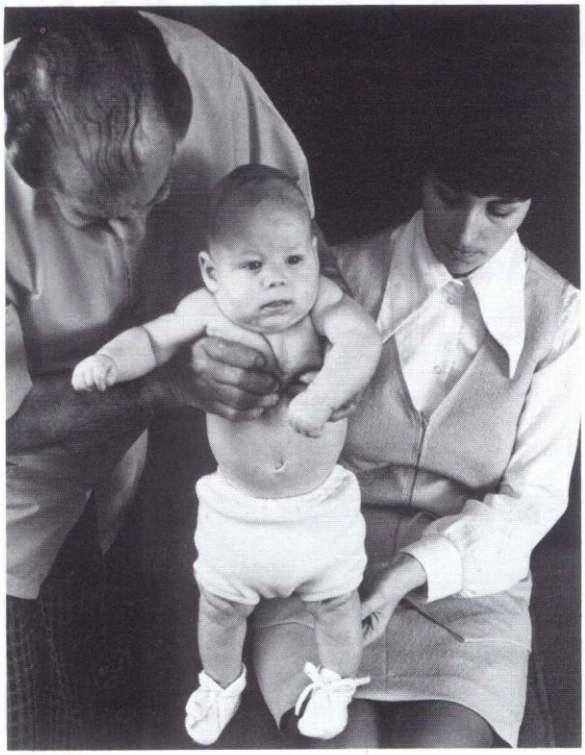
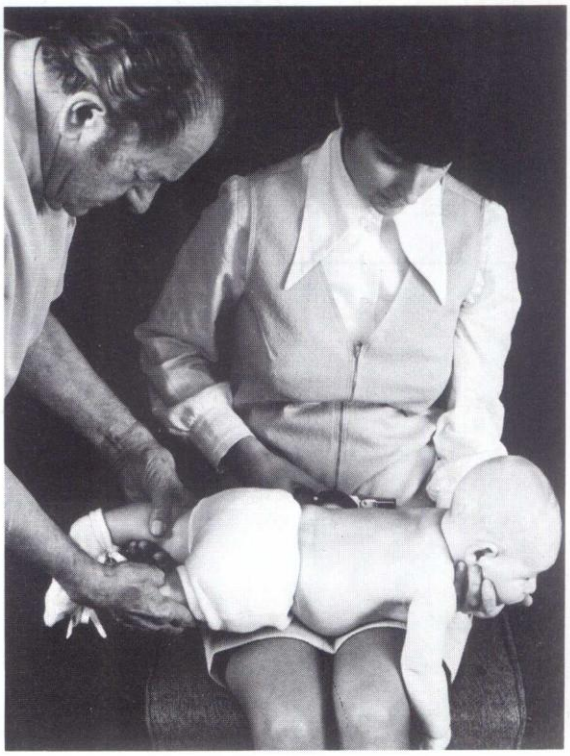


Figure 476: *The pelvis is checked in the prone position.*



Pelvic rotation may be more evident when the legs are observed while the child is being held with the doctor's hands under the axillae (Fig. 475). The baby's movements of the legs while in this position will also be quite revealing.

Further analysis of the pelvis may be done with the baby placed in the prone position on the parent's lap, as shown in figure 476. The outline of the gluteus muscles may be observed, as well as the relative widths of the ilia. In addition, the legs may be extended so that any leg length discrepancy can be ascertained (Fig. 477). All of these observations will be helpful in determining an ilium listing.

The location of nerve interference is determined with the use of the Nervoscope, just as it is on the adult. The cervical spine can be checked with the baby sitting in the parent's lap, as depicted in figure 478. Or, the child can be placed prone on the lap, as shown in figure 479.

The terminals of the Nervoscope will have to be narrowed considerably, in order to fit the small neck of the baby. Also, because of the highly elastic quality of the baby's skin, the instrument may have to be "dotted" along the spine, instead of being glided in the usual manner. This entails lifting the instrument from the skin and then replacing it a few millimeters higher or lower, and then noting the reading. This may have to be done in the cervical region only, but the entire spine can be traversed this way if necessary.

Another way of using the instrument is shown in figure 480. The front of the baby is held against the parent's chest, and she may talk to the baby to keep it occupied while the doctor is using the instrument. The thoracic and lumbar spines can be checked in this way, or the baby can be placed prone in the parent's lap as shown in figure 481.

Once it has been determined that a subluxation exists in the cervical spine, lateral flexion can be used to determine the side of lateral wedging. This can also be effectively done by supporting the child under the axillae, and bending him to one side, as shown in figure 482. After it is observed how far his head flexes toward the inferior shoulder, he is turned to the opposite side, and the degree to which the head flexes toward that shoulder is compared. The side to which the head flexes furthest to the shoulder is the narrow side of the wedge, and the segment is contacted on the opposite side (Fig. 483).

The side of spinous laterality can be determined by observing the degree of head rotation to either side, as shown in figure 484. The side toward which

Figure 477: *Checking for leg length discrepancy.*

Figure 478: *Using the instrument while in the sitting position.*

Figure 479: *Using the instrument in the prone position.*

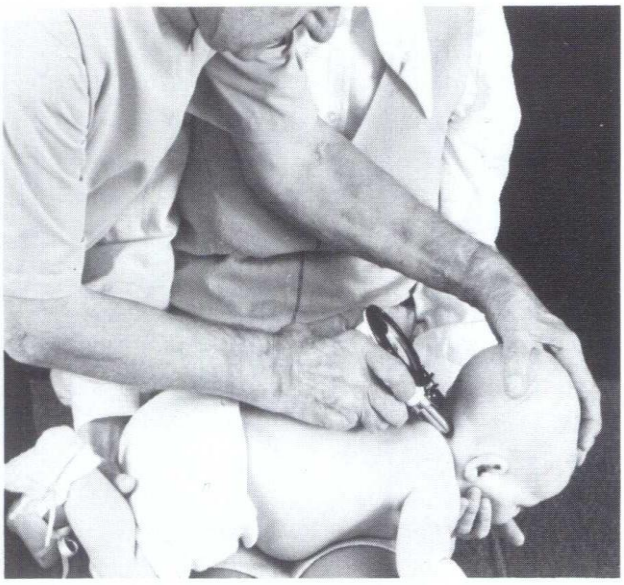


Figure 480: *Using the instrument while the parent holds the baby.*

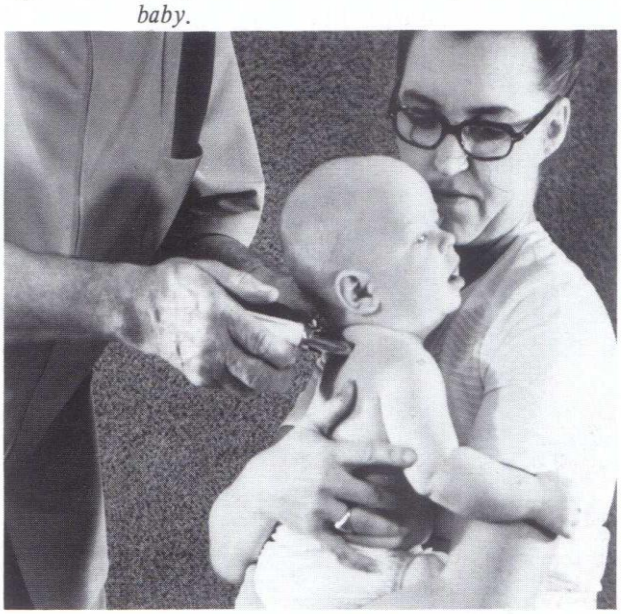
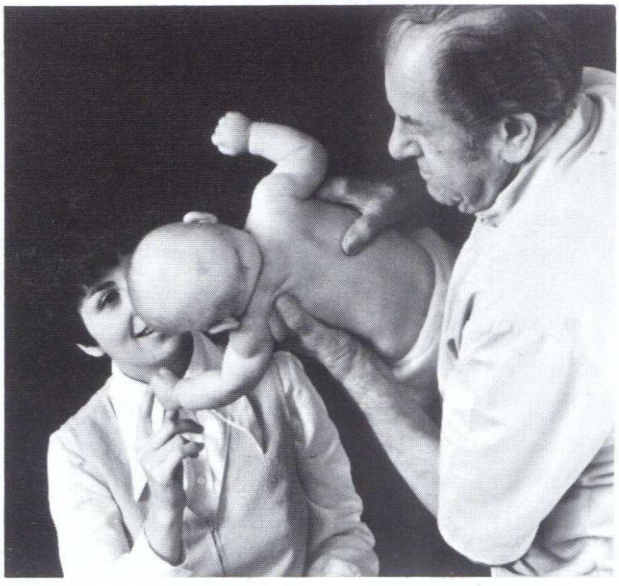


Figure 481: *Checking the lumbar spine.*

Figure 482: *Checking the lateral flexion to the left.*



head rotation is limited is the side of spinous laterality. In other words, if the head rotation is limited to the right, the listing will either be PR, or PR-La, depending on the lateral wedging.

The child's head can also be observed as in figure 484, to determine the side of atlas or condyle laterality. This can be confirmed by determining the side of fixation, using motion palpation. Anterior or posterior condyle misalignment must be determined by palpation, and by observing the position of the head from the lateral view.

Adjusting Procedures

When adjusting infants, the force of the thrust should be very light, and the depth should be limited and controlled. The resistance of the fixation should be overcome with a very quick thrust, but at the same time, the thrust should not be too hard or too deep.

Pelvic pull moves should be performed with the child lying on the pelvic table, with the Ex side down. The parent should assist the doctor by maintaining the correct leg and feet position of the baby. A right ilium Ex listing is demonstrated in figure 485. An ASEx or PIEx adjustment should be performed in a similar manner.

An ASIn listing is being demonstrated in figure 486. The mother assists by holding the feet, and the doctor thrusts inferiorward and lateralward to make the correction.

A PIIn left ilium listing is being shown in figure 487. The doctor's pisiform is on the inferior aspect of the PSS, and the thrust is superiorward and lateralward, to make the correction.

An alternative way of adjusting an In ilium is with the baby in the parent's lap, as shown in figure 488. In this position, the mother stabilizes the child's superior shoulder, while the doctor uses his stabilization hand to secure the feet. The thrust is then given in a lateralward, and either superior or inferior direction, depending on the listing.

Posterior sacrum listings should be corrected with the baby placed prone on the parent's lap, as shown in figure 489. The thumbs should be placed on the first sacral tubercle, one over the other. The thrust is delivered straight anteriorward. This is also an effective position for adjusting lumbar spinous listings. The thumb on the side of spinous laterality

Figure 483: *Checking for lateral flexion to the right.*

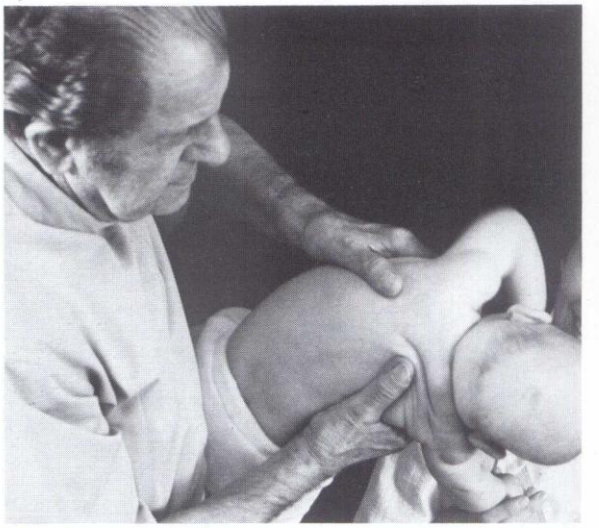


Figure 484: *Using head rotation to determine spinous laterality.*

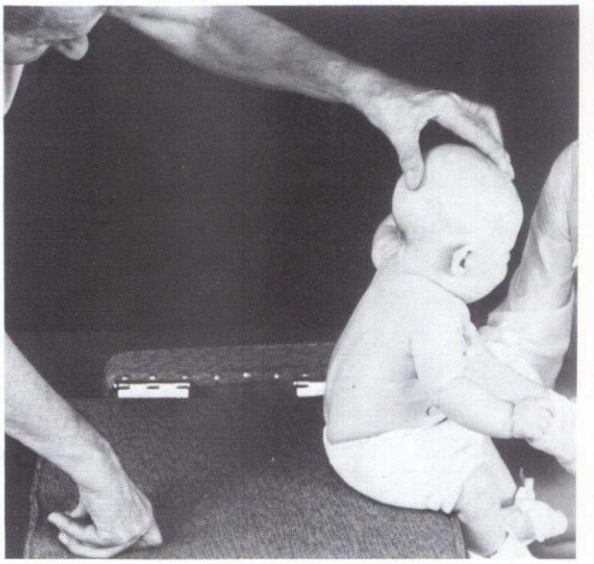


Figure 485: *Adjusting an Ex ilium.*

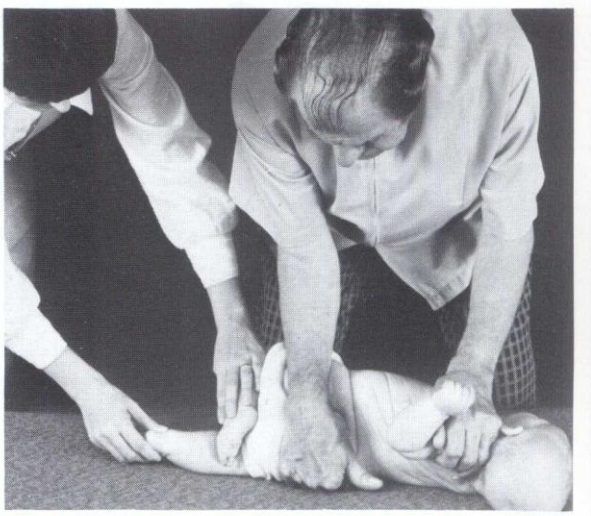


Figure 486: *Adjusting an ASIn left ilium.*

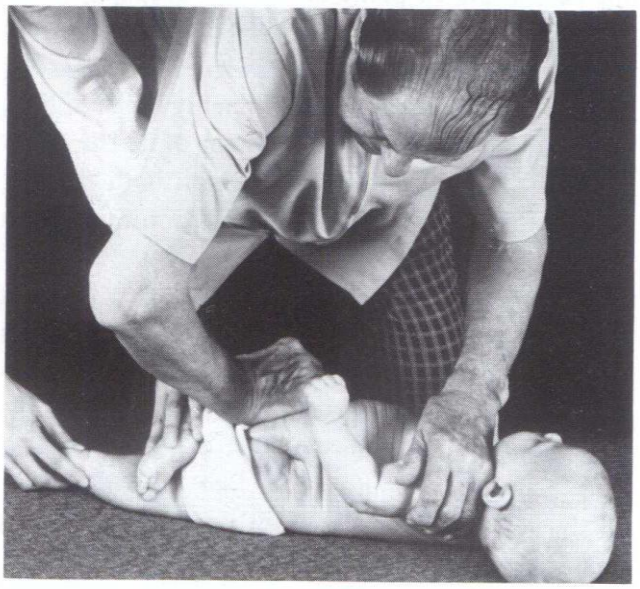


Figure 487: *A PIIn left ilium adjustment.*

should be placed first. The thrust is then given medialward, as well as anteriorward, and torque is used to reduce lateral wedging.

Lumbar spinous listings may also be adjusted with the baby placed in the side position, as shown in figure 490. This will be appropriate for mammillary listings as well. The listing being demonstrated is a PLS-Sp, with the pisiform contacting the spinous process of the fifth lumbar. With the pisiform moved to the left mammillary, the thrust would correct a PRI-M fifth lumbar listing, for example.

Lumbar listings may also be corrected with a pull move. This is demonstrated in figure 491, and shows the doctor's second and third fingers pulling the left mammillary, for a fifth lumbar PR-M listing.

Figure 488: *Adjusting an In ilium with the baby on the parent's lap.*

Figure 489: *The prone position for a posterior sacrum adjustment.*

Figure 490: *Adjusting a PLS-Sp fifth lumbar listing with the pisiform contact.*

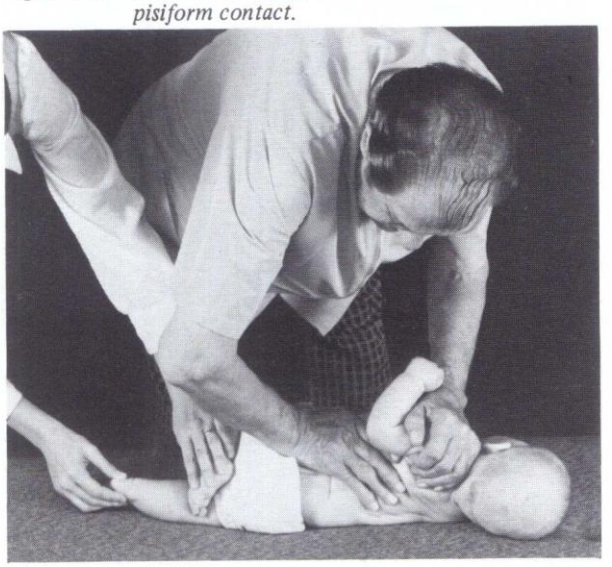


Figure 491: *Adjusting the fifth lumbar with a pull move.*

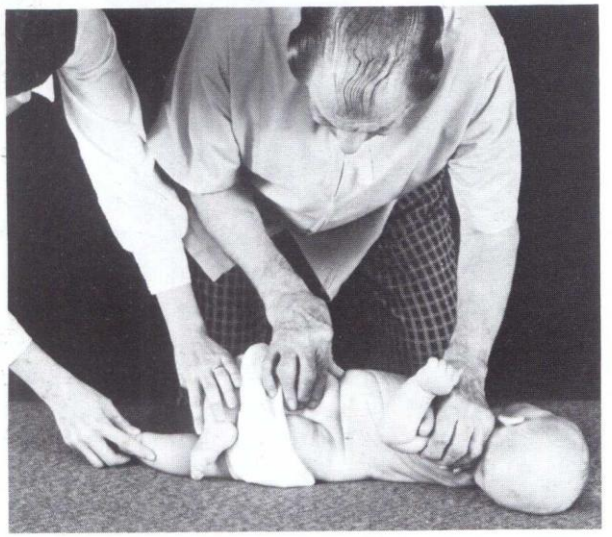


Figure 492: *The double thumb move for a thoracic spinous contact.*

All thoracic adjustments should be performed with the patient placed prone on the parent's lap. When a spinous contact is required, the doctor should use the double thumb move, as shown in figure 492. The thumb on the side of spinous laterality is placed first, with the other thumb placed on top of it. The thrust is directed through the spinous with both thumbs, anteriorward, medialward, and with torque when necessary.

Transverse contacts are performed with both thumbs on the transverse processes, as illustrated in figure 493. The thrust is directed through the transverse on the open side of lateral wedging, in the usual manner. The thumb on the opposite transverse merely stabilizes the thrust.

Upper thoracic and cervical spinous adjustments may be performed with the infant in the prone position on the parent's lap, as depicted in figure 494. The parent supports the baby's head, while the doctor places his thumb on the spinous contact point. With his stabilization hand, the doctor extends or flexes the head so the vertebral bodies are separated, allowing space for the vertebra to move. The thrust is made with the tip of the thumb, anteriorward, medialward, and with torque when appropriate.

Figure 493: *The thumbs on the transverses for a transverse process listing.*

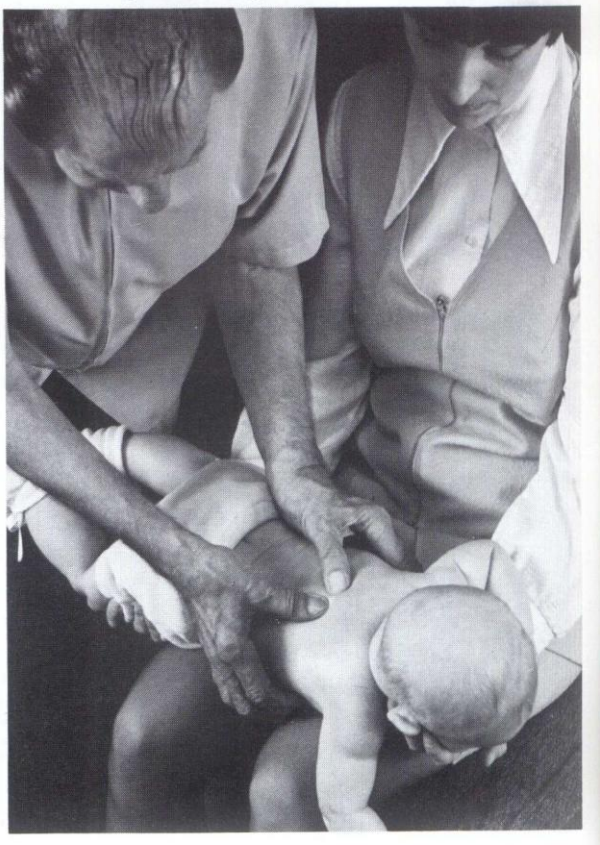


Figure 494: *Upper thoracic and cervical adjustments in the prone position.*

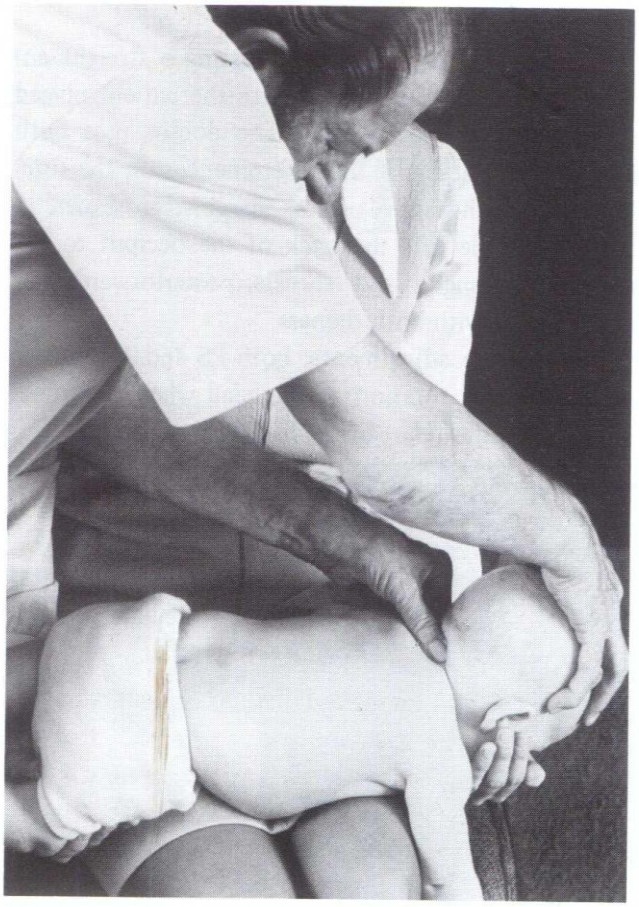


Figure 495: *Upper thoracic and cervical adjustments in the sitting position.*

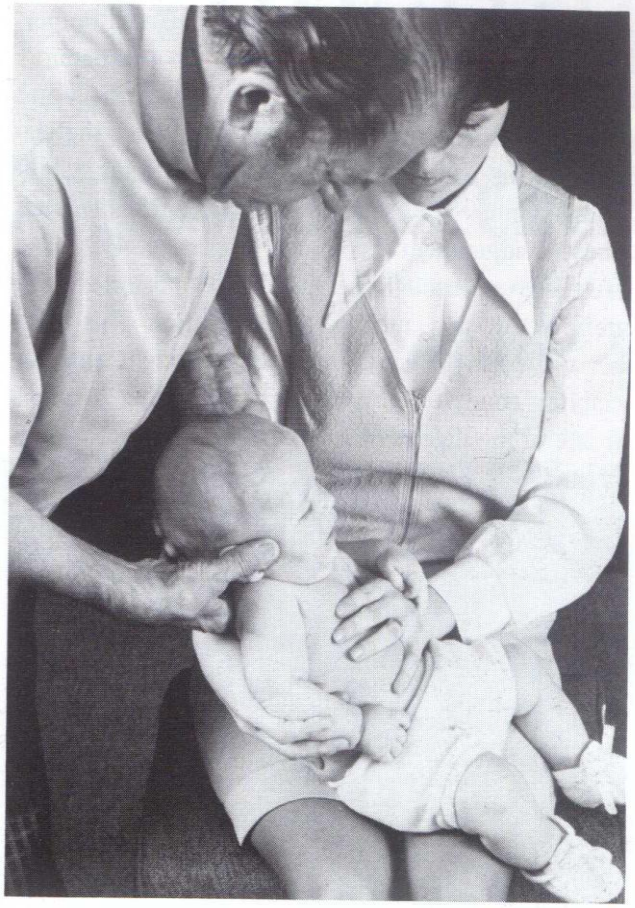


Figure 496: *Adjusting an ASR atlas listing.*

Upper thoracic and cervical adjustments may also be made with the baby in the sitting position. This position is suitable for spinous as well as transverse or lamina listings. The parent supports the baby's chest with her hand, to limit forward motion when the thrust is given. Figure 495 shows the setup for a PRS axis adjustment.

Atlas adjustments may also be performed with the child in the sitting position. Figure 496 illustrates the setup for an ASR atlas listing.

All PS occipital condyle adjustments are likewise performed with the baby sitting on the parent's lap. The doctor uses the tip of his thumb to contact behind the baby's ear, and above the mastoid process. Figure 497 shows a PS-RS condyle adjustment.

The AS occipital condyle moves are performed with the patient in the supine position. The baby's head should rest on a firm surface to stabilize the occiput. With the doctor standing on the side of contact, the metacarpal heads are placed on the forehead, over the supra-orbital margin, on the side of laterality. The back of the occiput is lifted so that the condyle and atlas are separated, allowing movement to occur. The thrust is given posteriorward,

inferiorward, and medialward. Figure 498 illustrates the setup for an AS-LS occipital condyle adjustment.

An anterior condyle adjustment may also be performed with the child lying supine on the parent's lap. The doctor stands on the side of laterality, and places the pisiform of the contact hand over the glabella. He supports the baby's occiput with his stabilization hand. The setup for an AS-RS occipital condyle adjustment is shown in figure 499. The thrust is given through the glabella in a posteriorward, inferiorward, and medialward direction. This position may also be used to adjust a straight anterior occipital condyle subluxation. This listing assumes no lateral misalignment or rotation. The doctor may stand on either side, and contact the glabella with either hand. The direction of thrust is posteriorward and inferiorward.

An optional method for adjusting a straight anterior condyle subluxation is with the patient placed supine on the pelvic table. The doctor uses both hands, and places the thenar eminences on the forehead above the supra-orbital margins, as shown in figure 500. He lifts the back of the occiput to the appropriate angle, and thrusts posteriorward and inferiorward with both thenars.

All condyle adjustments, both PS and AS moves, should include rotation of the head when rotational misalignment is a part of the listing.

Figure 497: *Adjusting a PS-RS condyle listing.*

Figure 498: *Adjusting an anterior condyle with an AS-LS listing.*

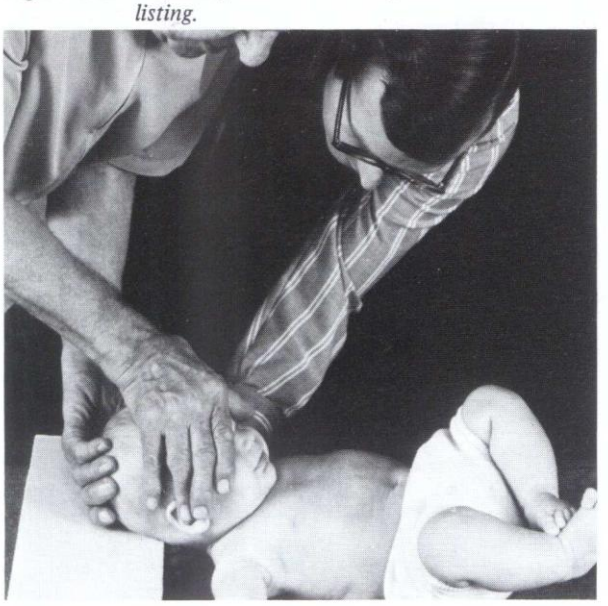


Figure 499: *An AS-RS condyle adjustment while in the mother's lap.*

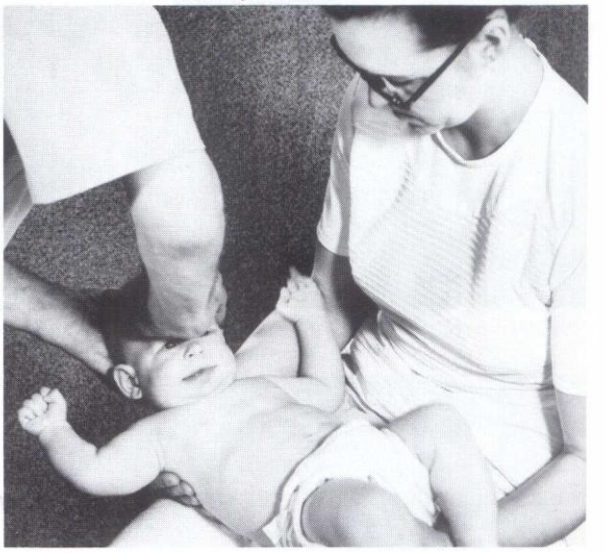
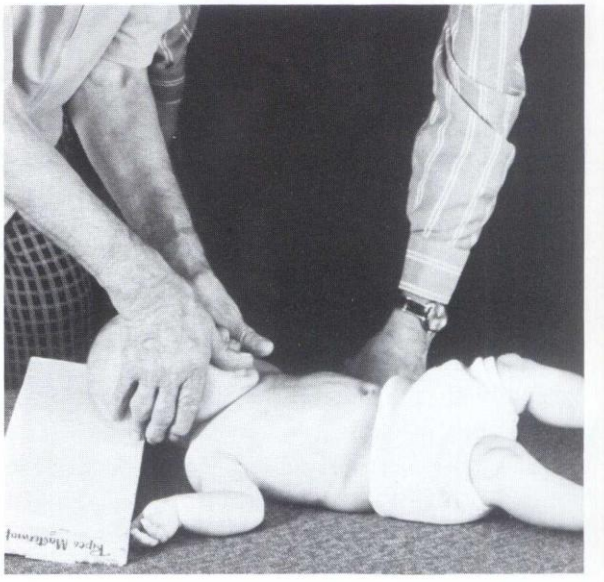


Figure 500: *Adjusting the straight anterior condyle.*



Adjusting The Extremities

Chapter 20

Gonstead Chiropractic Science & Healing Art

Chapter 20

Adjusting The Extremities

Many joints of the body other than those of the spine are subject to loss of articular juxtaposition, which, as a result, interferes with the normal transmission of nerve impulses. This forms the philosophical basis for including extra-spinal adjusting within the pervue of chiropractic care. But on a practical level, all "subluxations", whether of the spine or elsewhere, produce pain and dysfunction, and must be corrected. Also, the integrity of the spine – its alignment and function – is often dependent on the normal function of the other joints as well. Likewise, if the doctor of chiropractic is to regard the body as a total integrated whole, instead of a collection of independent parts, then he must consider all of the articulations as within his scope of practice.

Adjusting The Knee

There are two basic misalignments of the knee. One is the medialward misalignment of the femur on the tibia, which is designated as an "In" femur. The other is the lateralward misalignment of the tibia on the femur, which is regarded as an "Ex" tibia. In addition, both the femur and the tibia may rotate one way or the other after misaligning sideways. If the medial portion of the femur rotates anteriorward, which is by far the more common direction of rotation, the listing is "AIn" femur, the A representing the anterior direction of rotation, and the In representing the internal or medialward direction of misalignment. The medial portion of the femur may sometimes rotate posteriorward, in which case the listing will be "PIn" femur.

After the tibia misaligns lateralward, it may rotate posteriorward, which is the more common direction of rotation. The tibia will then be listed as a "PEx" tibia. If the lateral portion of the tibia rotates anteriorward, the listing will be "AEx" tibia.

Figures 501 and 502 represent the x-ray analysis of an AIn femur and a PEx tibia. When taking the radiograph of the knees, the patient should be standing A to P, and the feet should be placed parallel to each other. Both knees should be x-rayed together, on one 14 x 17 film.

To establish the alignment of the tibia, a short line should be drawn on the lateral border of the lateral condyle, and another on the medial border of the medial condyle, as shown. The distance between the lines should be bisected, and a dot is placed midway between the lines. Another dot is then placed in the middle of the shaft of the tibia. A line which extends into the knee articulation should be drawn through the two dots, as shown. The femur alignment is established by placing a dot in the middle of the patella, and another dot in the middle of the shaft of the femur. A line is then drawn through the two dots, extending it into the knee articulation, as shown. A line should then be drawn on the upper surface of the tibia, which represents the plane of the surfaces of the condyles. Another line is drawn along the bottom of the femur, representing the plan of the surfaces of its medial and lateral condyles. The wedging of these two plane lines will indicate whether to adjust the femur or the tibia. If the wide end of the wedge is medialward, then the femur has misaligned on the tibia, and the femur should be listed. If the wide end of the wedge is lateralward, the tibia has misaligned on the femur, and the tibia should be listed.

Figure 501: *Radiograph of an AIn femur.*

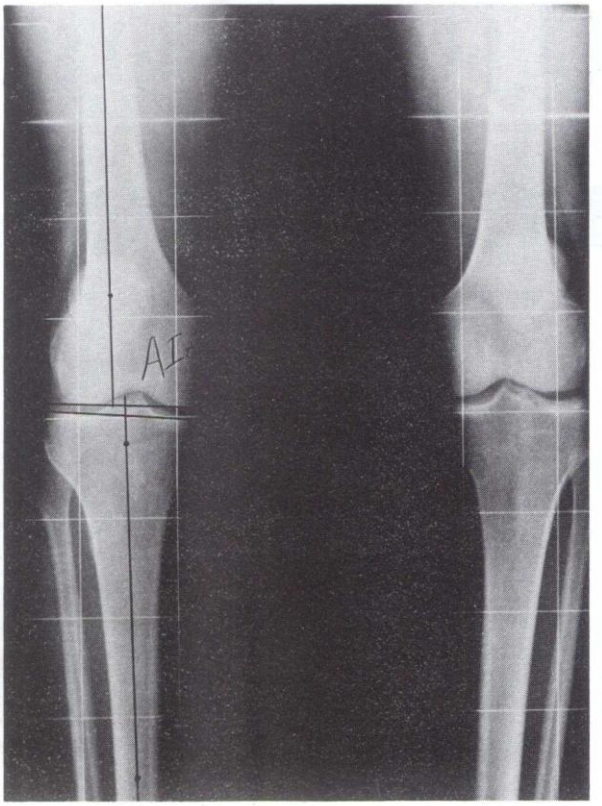
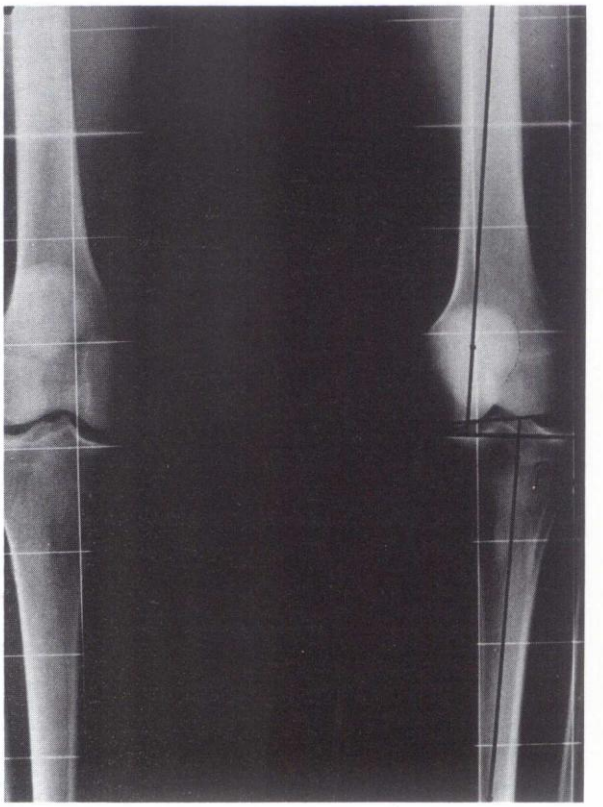


Figure 502: *Radiograph of a PEx tibia.*

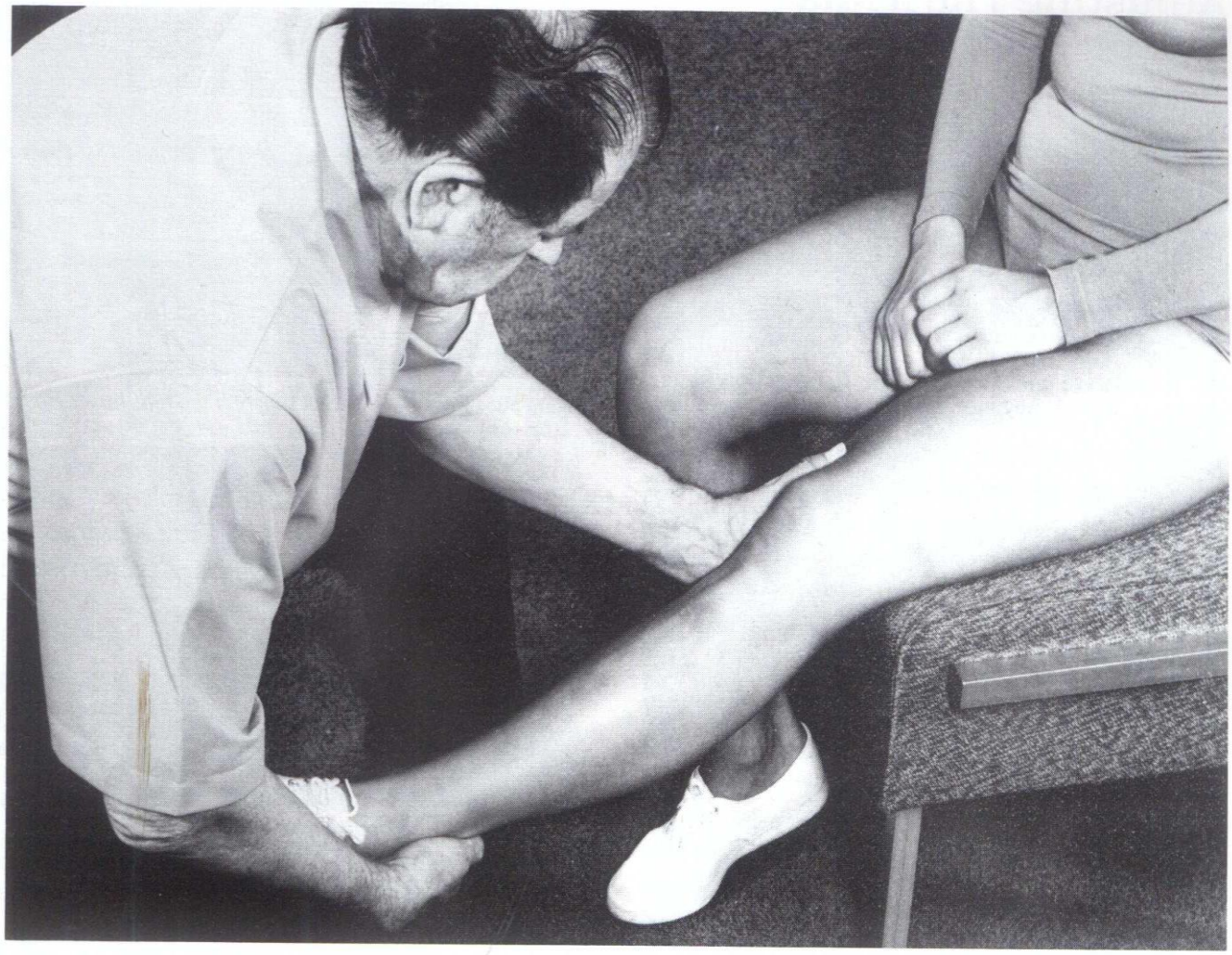


Rotation should then be determined by comparing the shaft line through the femur with the shaft line through the tibia. Since the patella is over the anterior surface of the femur, the femur shaft line represents the anterior surface of the femur. Normally, the patella will be in the center of the femur, in the middle of the intercondylar fossa. If the patella is lateralward, this indicates that the medial border of the femur has rotated anteriorward. If the patella is medialward, then the medial border of the tibia has rotated posteriorward. Therefore, the placement of the patella, which is on the anterior surface of the femur, establishes the rotational relationship between the femur and the tibia. If the patella appears in the center of the femur, it may be necessary to measure more accurately, by using dots and lines, the distance from the center of the patella to the medial and lateral epicondyles. This will establish the precise rotation of the femur when it is too close to merely visualize it.

To determine a knee listing, therefore, one must first look at the wedge lines representing the planes of the condyles. If the wide end of the wedge is medialward, then the femur is listed (Fig. 501). If the wide end is lateralward, the tibia is listed (Fig. 502). Once it has been established that the femur is the problem, if the patella has deviated lateralward, the medial border of the femur has rotated anteriorward, and the femur is listed AIn. This is shown in figure 501. If the patella has deviated medialward, the femur would be listed PIn, since this indicates that the medial border of the femur has rotated posteriorward.

After it has been established that the tibia is the problem, as indicated by the open end of the wedge being lateralward, the rotation of the tibia must be determined. This is done by comparing its rotation with that of the femur. If the tibia shaft line falls to the lateral side of the femur shaft line, this indicates that the lateral border of the tibia has rotated posteriorward, in relation to the femur. This is represented in figure 502, and the tibia is listed PEx. If the tibia shaft line falls to the medial side of the femur shaft line, it indicates that the lateral border of the tibia has rotated anteriorward. Therefore, the tibia would be listed AEx.

Figure 503: *Adjusting the AIn or PIn femur.*

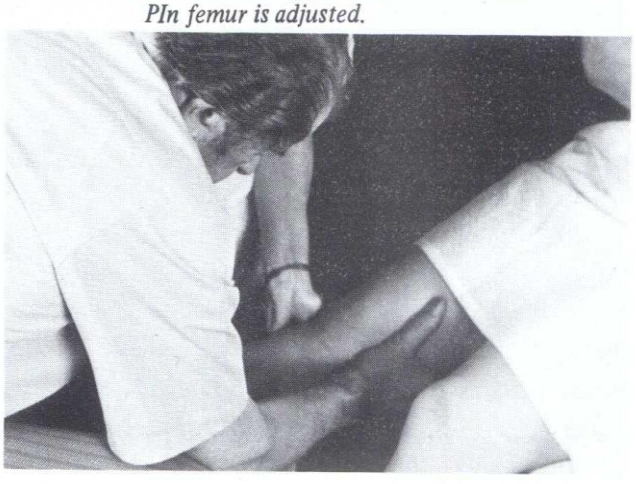


Adjusting The Femur With The Patient Sitting

The knee is adjusted with the patient in either the sitting position or lying prone. The doctor will also be seated when the sitting position is selected. The doctor will sit so that he straddles the patient's knee to be adjusted (Fig. 503). For a femur adjustment, the doctor will place the thenar eminence of his contact hand on the medial surface of the medial condyle of the femur, just above the medial meniscus. The doctor's other hand supports the patient's leg by lifting it at the ankle, the thenar eminence of that hand being placed on the lateral malleolus. The slack is reduced by putting lateralward pressure on the contact point, and medialward pressure on the lateral malleolus. The thrust is given quickly, in a lateralward direction, a number of times until a reduction is felt. Various degrees of flexion of the knee may have to be tried before the femur will move. The thrust must also be applied to correct for rotation. If the listing is an AIn femur, the thrust will also rotate the medial border of the femur posteriorward. For a PIn femur adjustment, the thrust will rotate the medial border of the femur anteriorward, as well as straight lateralward.

Figure 503 illustrates an AIn or PIn femur adjustment. When it is difficult to move the femur this way, it may be helpful to use an assistant to support the tibia from the lateral side, as shown in figure 504. The assistant's thenar is placed on the lateral border of the lateral condyle.

Figure 504: *An assistant supports the tibia while an AIn or PIn femur is adjusted.*



Adjusting The Tibia With The Patient Sitting

When adjusting the tibia, the doctor places the thenar eminence of the contact hand on the lateral border of the lateral condyle of the tibia, as shown in figure 505. The opposite hand supports the medial malleolus of the ankle as shown in figure 506, and lifts the foot slightly from the floor. The slack is reduced by applying medialward pressure with the contact hand, and lateralward pressure with the stabilization hand. The thrust is given quickly, straight lateralward, and slightly anteriorward or posteriorward, depending on the listing. The knee may have to be flexed at various angles before movement can be effected. In figure 507, an assistant is shown stabilizing the femur. Her hand is under the leg, and her fingers are grasping the medial border of the medial condyle of the femur. The listing being adjusted is an AEx right tibia. As the doctor thrusts medialward, he will also thrust slightly posteriorward, thereby correcting the rotation. By having the assistant's hand under the knee, her hand will counteract the rotation of the thrust, and stabilize the femur. For a PEx femur listing, the assistant's stabilization hand would be placed over the top of the knee, to counteract the anterior rotation of the thrust.

Adjusting The Femur In The Prone Position

When adjusting the knee in the prone position, the doctor will stand medially to the patient. When adjusting the femur, the doctor will place the thenar of his contact hand over the medial border of the medial condyle, as shown in figure 508. This is the contact for an AIn femur in the prone position. The doctor's stabilization hand grasps the patient's ankle, while the assistant supports the lateral border of the tibia. To take out the slack, the doctor pulls lateralward with his contact hand, and pushes the ankle medialward. The thrust is directed lateralward, while at the same time the medial border of the femur is rotated posteriorward, to correct the rotation. For a PIn femur, the doctor's contact hand would be placed under the knee so that the pisiform could contact the medial border of the medial condyle. Then the thrust would not only direct the femur lateralward, but it would also rotate the medial border anteriorward, thus correcting the rotation.

Figure 505: *Contacting the tibia for an AEx or PEx tibia adjustment.*

Figure 506: *The stabilization supports the foot for a tibia adjustment.*

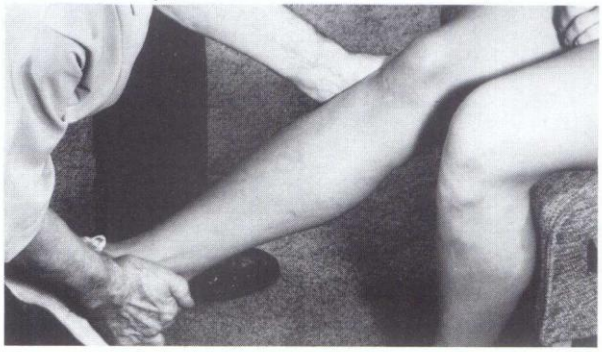


Figure 507: *An assistant supports the femur while an AEx tibia is being adjusted.*

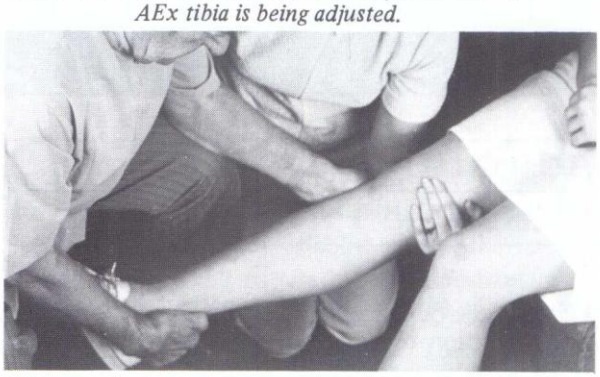
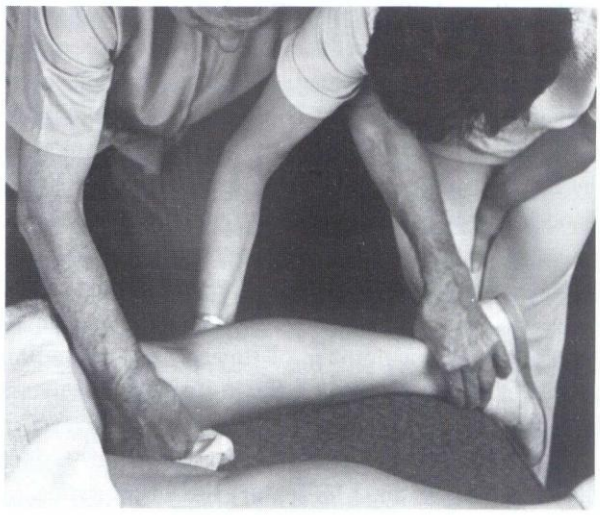


Figure 508: *Adjusting the femur in the prone position.*



The AIn adjustment of the left femur is shown in figure 509 on a skeletal specimen. The doctor is pulling the medial border of the femur lateralward, while at the same time rotating it posteriorward. The assistant is stabilizing the tibia by supporting the lateral border of the tibia, and rotating it anteriorward.

Adjusting The Tibia In The Prone Position

The tibia adjustment in the prone position is shown on a skeletal specimen in figure 510. The doctor places his thenar on the lateral border of the tibia, while grasping the ankle with the opposite hand. The assistant stabilizes the knee by reaching under and supporting the medial border of the femur. The doctor applies lateralward traction on the medial malleolus with his stabilization hand, and thrusts with the contact hand, medialward and anteriorward or posteriorward, depending on the listing. The thrust may have to be given with various degrees of flexion at the knee before movement will occur.

Adjusting The Posterior Tibia

If the patient complains of a knee that can neither be flexed or extended, and is in a locked position of flexion, the problem may be a posterior tibia. The patient should be placed in the prone position, and the doctor will bend over so that the foot fits over the shoulder, as shown in figure 511. The doctor's hands are placed on the posterior surface of the tibia, one over the other. The slack is reduced, and the thrust is then given quickly in a P to A direction.

Adjusting The Fibula

The fibula may sometimes misalign at the superior tibiofibular articulation, and produce severe pain and limited motion. The capsular ligament will be edematous and painful. If the point of maximum tenderness is medialward to the head of the fibula, this indicates a posterior and lateral fibula misalignment. The doctor should stand on the medial side of the patient, and place the pisiform of the contact hand on the lateral border of the head of the fibula, as shown in figure 512. The doctor then flexes the knee by raising the ankle. As the leg is brought back

Figure 509: *Demonstrating an AIn femur adjustment in the prone position.*

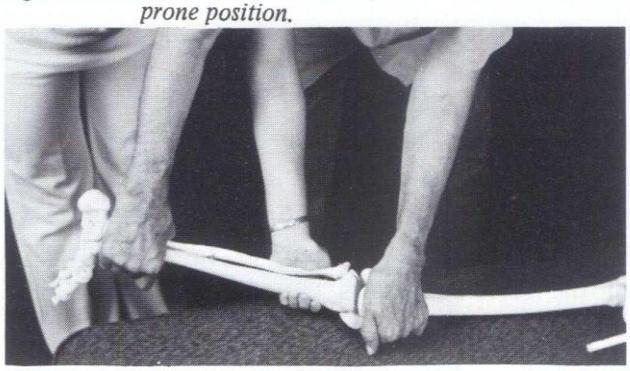


Figure 510: *Demonstrating a tibia adjustment in the prone position.*

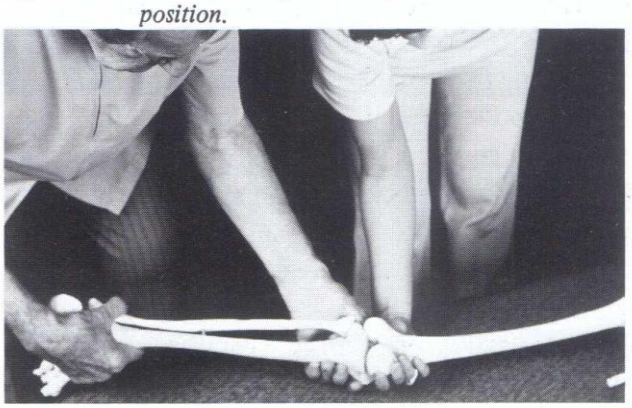


Figure 511: *Adjusting the posterior tibia.*

Figure 512: *Adjusting a posterior and lateral fibula.*

toward maximum tension, the thrust is given with the contact hand in an anteriorward and medialward direction.

Medial displacement of the fibula at the superior tibiofibular joint is evident by pain and edema at the lateral margin of the head of the fibula. This is corrected by placing the patient prone, with the leg extended. The doctor stands on the opposite side of the involved leg, as shown in figure 513. He reaches over the opposite leg, and contacts the medial border of the head of the fibula with the pisiform of the superior hand. The thrust is directed anteriorward and lateralward.

The lower portion of the fibula will sometimes displace posteriorward, as the aftermath of an ankle sprain. To correct it, the patient is placed prone, and the posterior border of the lateral malleolus is contacted with the pisiform. This is demonstrated in figure 514. The thrust is directed anteriorward.

Figure 513: *Adjusting a posterior and medial fibula.*

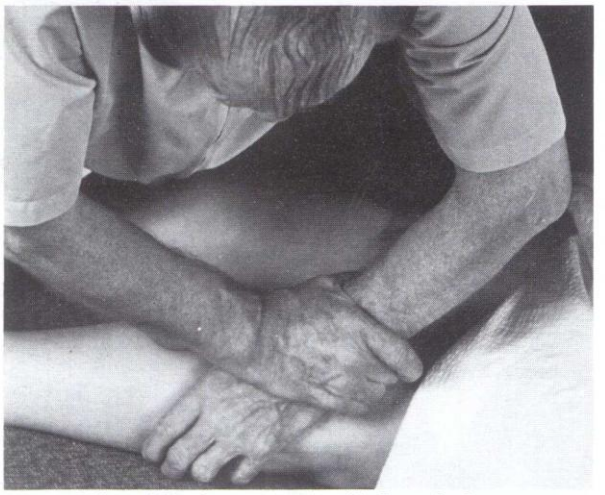
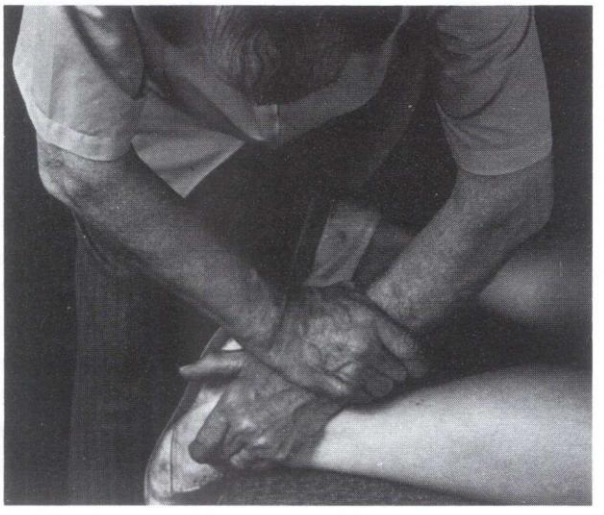


Figure 514: *Adjusting a posterior fibula at the lower end.*



Adjusting The Foot

The calcaneus is subject to posterior misalignment, and will produce pain at the back of the heel, or throughout the ankle. The doctor sits opposite the seated patient, and grasps the posterior calcaneus with his hand, as seen in figure 515. With his other hand, he supports the foot by holding it around the metatarsals. He takes out the slack by pulling the calcaneus inferiorward. The thrust is then given sharply in a straight anteriorward direction.

The cuboid will often become misaligned in a superiorward direction, between the calcaneus and the metatarsal bases. This will produce difficulty in walking due to pain at the lateral portion of the foot. Figure 516 demonstrates adjusting the cuboid of the left foot. The doctor lifts the foot by the back of the heel, while placing the thenar of his right hand on the dorsal and lateral aspect of the cuboid. He then grasps the foot by the metatarsals with his left hand, and dorsiflexes the foot slightly to allow room for the cuboid to move. There is also a slight abduction of the front of the foot, bringing the toes lateralward. The thrust is given in an inferior and slightly medialward direction.

The cuneiform bones will sometimes misalign in an inferior direction, producing pain in the arch. They should be located by palpation, as indicated by a very tender capsular ligament. They are adjusted by placing the tip of the thumb on the plantar surface of the arch, over the cuneiform, and thrusting superiorward.

Most painful arch conditions result from navicular misalignment. The direction of misalignment is medialward and inferiorward. To correct the misaligned navicular, the thenar is used to contact the inferior and medial surface. This is demonstrated in figure 517. The foot is inverted and adducted with the stabilization hand, bringing the toes medialward and inferiorward, which allows room for the navicular to move. The direction of thrust is demonstrated in figure 518, and is a combination of superiorward and lateralward.

Painful conditions of the transverse arch of the foot are usually due to inferior misalignments of the metatarsal heads. These are corrected by having the patient's heel resting on the knee, and placing the lateral border of the flexed index finger under the head of the affected metatarsal. The interphalangeal

Figure 515: *Adjusting the calcaneus.*

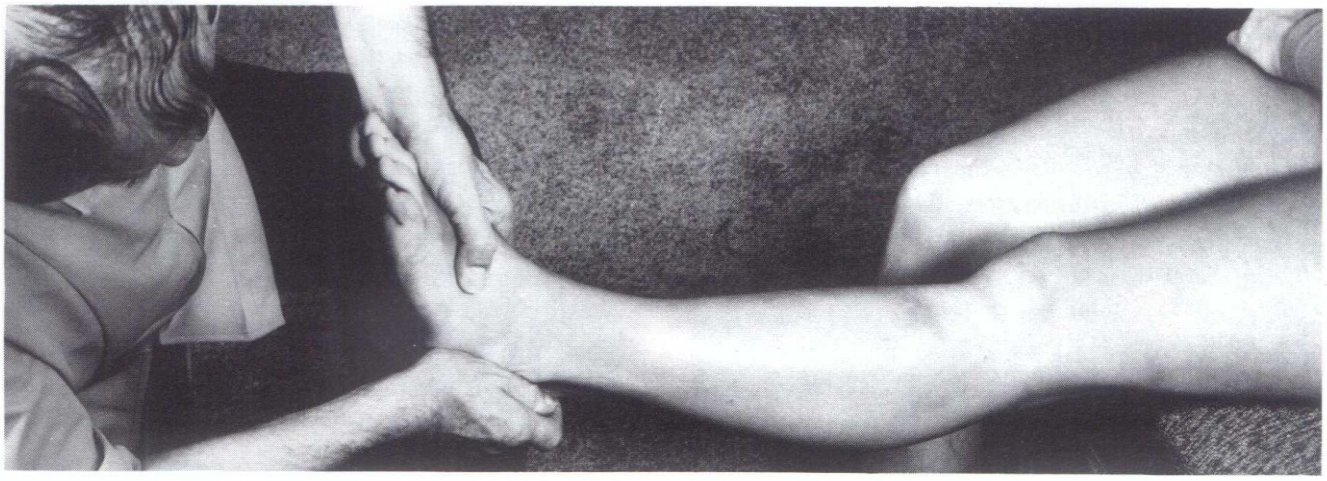


Figure 516: *Adjusting the cuboid.*

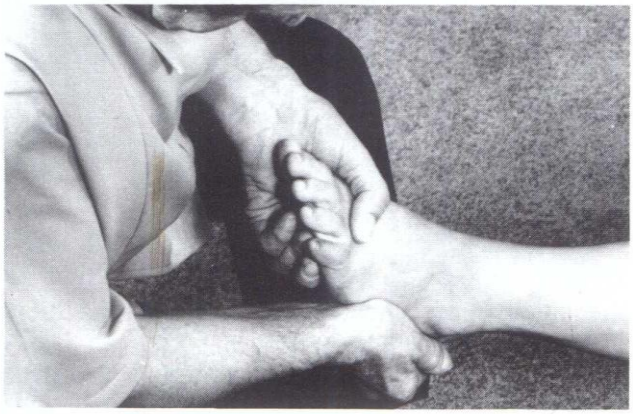


Figure 517: *Adjusting the navicular.*

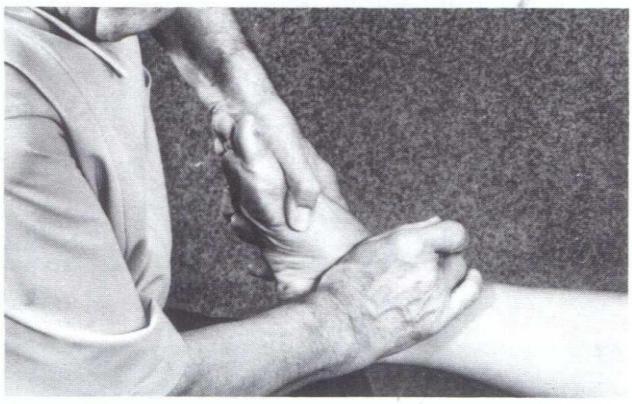


Figure 518: *The direction of thrust for a navicular adjustment.*

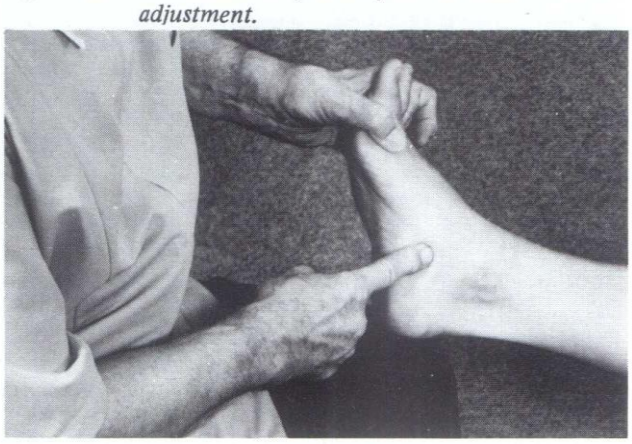
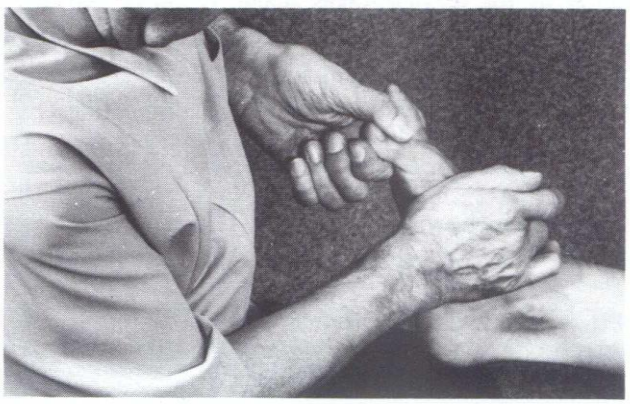


Figure 519: *Adjusting the metatarsal heads.*

Figure 520: *Adjusting the great toe.*



joint between the proximal and middle phalanges is used. The thumb of the contact hand is then placed over the dorsal surface of the toe, as shown in figure 519. A very quick thrust is then given on the head of the metatarsal, in a superiorward direction. A metatarsal support may be needed for a period of time in order to maintain the correction.

A very common foot problem is bunion of the great toe, which is usually caused by misalignment between the first metatarsal and its adjacent phalange. To correct the condition, the head of the first metatarsal must be adjusted superiorward and lateral-

ward, since the direction of misalignment of the metacarpal head is inferiorward and medialward. Figure 520 illustrates the correction of the first metatarsal head of the right foot. The doctor's right thenar is used to contact the inferior-medial border of the metatarsal head, while the other hand stabilizes the great toe. The thrust is quickly applied with the thenar in a superior and lateral direction.

Adjusting The Clavicle

The sternal end of the clavicle is subject to either posterior or anterior misalignment, with respect to the sternum. The symptoms will be pain and swelling at the sternoclavicular joint. A posterior clavicle is corrected by the doctor applying a passive arm movement which includes abduction, external rotation, and extention of the shoulder. Figures 521 and 522 show the adjustment procedure for a posterior left clavicle. With his left hand, the doctor supports the weight of the patient's arm by holding it slightly above the wrist. The tips of the second, third, and fourth fingers of the right hand are placed over the sternoclavicular joint, so that when anterior movement of the clavicle takes place, it can be felt (Fig. 521). Without any help from the patient, the doctor brings the patient's arm up and backwards, while externally rotating the arm at the same time (Fig. 522). This should be done with moderate speed, and it is not necessary to bring the arm backwards any further than is shown in figure 522. This same move may also be done with the patient in the supine position.

Figure 521: *Adjusting a posterior clavicle.*

An anterior clavicle can also be corrected with the patient sitting or lying supine. In the sitting position, the doctor places the thenar eminence over the sternal end of the clavicle, as shown in figure 523. The doctor's other hand lies over the scapula, directly behind the thrusting hand. The direction of thrust is posteriorward, and slightly lateralward. Figure 524 shows the anterior clavicle being corrected with the patient in the supine position. The pisiform of the thrusting hand is placed over the sternal end of the clavicle as shown. The doctor's other hand stabilizes the thrust. The direction of thrust is posteriorward and slightly lateralward.

Adjusting The Shoulder

Most shoulder misalignments occur when the head of the humerus is displaced inferiorward and anteriorward, in relation to the glenoid fossa. The symptoms include various degrees of limited motion, from slightly limited adduction and internal rotation, to the total frozen shoulder syndrome. In addition, there is usually painful bursae, and pain and edema around the acromion and rotator cuff. The correction is made with the patient in the sitting position. The doctor stands behind the patient, and slightly to the side of the uninvolved shoulder (Fig. 525). When adjusting the right shoulder, the doctor holds the patient's right elbow with his right hand, and with his left hand he holds the patient's right wrist, as shown in figure 525. The elbow is flexed to ninety degrees, and pronated so that the palm faces downward. The shoulder is first abducted to ninety degrees, and then

Figure 522: *The doctor lifts the patient's arm to adjust the posterior clavicle.*

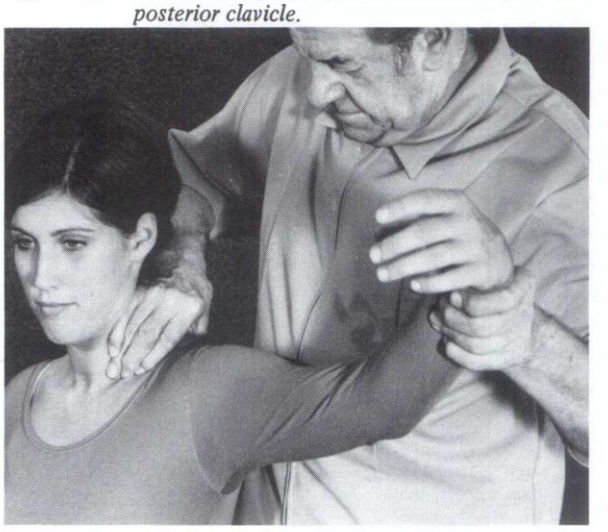


Figure 523: *Adjusting the anterior clavicle with the patient sitting.*

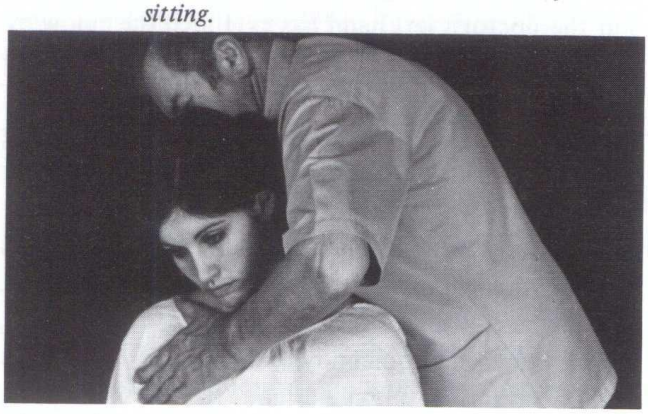


Figure 524: *Adjusting the anterior clavicle with the patient supine.*

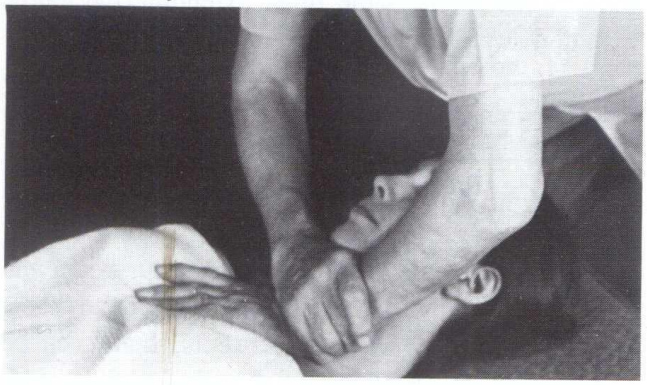


Figure 525: *Adjusting the shoulder. Bringing the arm into position.*

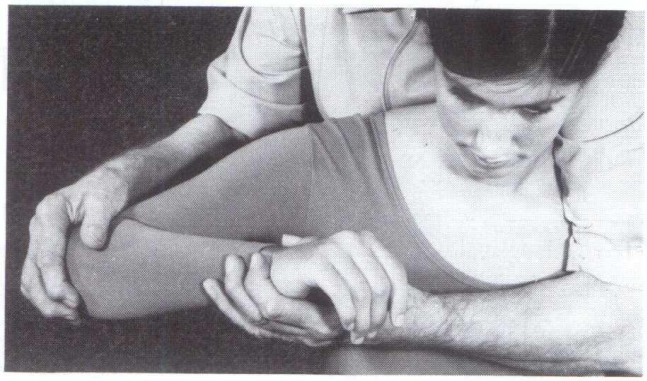


Figure 526: *Bringing the elbow medialward, and the hand lateralward.*

Figure 527: *Thrusting superiorward and posteriorward.*

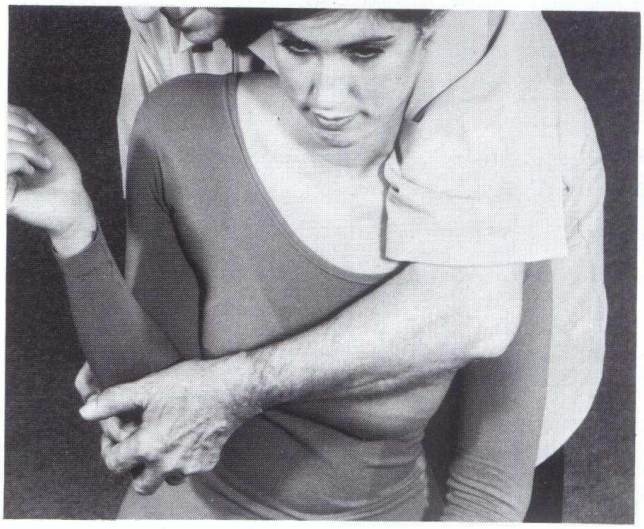


Figure 528: *Adjusting the inferior and posterior humerus.*

it is adducted, flexed slightly forward, and externally rotated, so that it is in the position shown in figure 526. The doctor then places his left hand over the other one so that it too supports the elbow. The slack is reduced by slowly lifting the arm superiorward and posteriorward, and then the thrust is given in that same direction. The depth of the thrust should be very shallow at first. If there is any pain, even with a light thrust, then another arm position should be tried. This should be repeated until the correct alignment is found, and reduction can be effected without being painful. Figure 527 shows the doctor in position to make the thrust in a superiorward and posteriorward direction.

The head of the humerus can also misalign inferiorward and posteriorward. This is corrected with the doctor standing behind the patient, and to the involved side, as shown in figure 528. The patient's elbow is extended and supinated, and is supported at the wrist. With the shoulder abducted, the doctor places the volar aspect of his wrist under the posterior border of the head of the humerus. The thrust is given in a superiorward and anteriorward direction, with the wrist on the head of the humerus.

Adjusting The Elbow

Misalignments of the elbow produce swelling and limitation of motion. The more common misalignment is posterior and lateral displacement of the head of the radius, at the humeroradial joint. There will usually be extreme tenderness below the lateral epicondyle, between the capitulum and the radial head. To make the correction, the doctor stands on the side of the involved elbow, and faces the patient as shown in figure 529. When adjusting the left elbow, the doctor's right hand will be the contact hand. The patient's arm is raised at the wrist with the stabilization hand, while the thenar of the contact hand is placed over the posterior and lateral surface of the head of the radius. The patient's arm should be supinated, and flexed slightly at the elbow. The thrust is given with a slight medialward and anteriorward motion of the contact hand, while at the same time, extending the elbow by pushing downward on the patient's wrist. The thrust should be given quickly, but not too deeply. Figure 529 shows the left elbow being adjusted. The thenar is placed on the head of the radius, and the doctor's left hand has extended the elbow by pushing the wrist downward. At that instant, the thrust is given.

Figure 529: *Adjusting the radius.*

Figure 530: *Adjusting the ulna.*

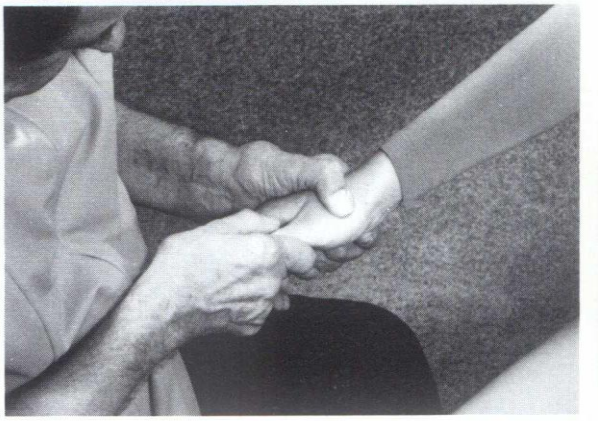
The ulna will misalign at the elbow by slipping medialward and posteriorward at the humeroulnar articulation. To make the correction, the doctor should stand on the side of the involved elbow, and support the patient's arm as shown in figure 530. The thenar is placed on the medial border of the ulna, below the medial epicondyle and the trochlea. The patient's arm is supinated and flexed slightly, as shown. The thrust is given lateralward and anteriorward, while at the same time, extending the elbow with downward pressure on the patient's wrist.

Adjusting The Wrist

Most misalignments of the carpals occur when the wrist is forcefully flexed, the involved bone being displaced dorsally. When this occurs, there will be pain during flexion of the wrist, and sometimes with extension as well. The carpals will also sometimes

Figure 531: *Adjusting a posterior carpal.*

Figure 532: *Adjusting the thumb.*



misalign anteriorly. The specific carpal, and the direction it has misaligned, must be determined through palpation. Once the misaligned carpal has been determined, the doctor should face the patient as shown in figure 531. The doctor places his thumbs over the involved carpal, one over the other, as shown in figure 531. For a posterior displacement, the thumbs are placed over the dorsal surface of the carpal, and the wrist is extended slightly, so that the carpals are separated at their volar aspect, thereby allowing room for movement to occur. The thrust is given quickly in a posterior to anterior direction. For a carpal misalignment toward the volar surface, the patient's arm is supinated so that the front of the wrist is exposed, and the involved carpal is contacted with the thumbs. The wrist is flexed slightly before the thrust is given, so that there is room for the correction to take place. The thrust is given in an anteriorward to posteriorward direction.

Adjusting The Thumb

The base of the metacarpal of the thumb will often misalign in a posterior and lateral direction, with respect to the trapezium. For the correction, the doctor contacts the posterior and lateral aspect of the base of the first metacarpal with his thumb, as shown in figure 532. The thumb is supported with the doctor's other hand on the proximal phalanx, as shown. The thrust is given by applying force quickly, and with controlled depth, on the base, while pulling the head of the metacarpal distally at the same time.

Adjusting The Fingers

The proximal phalanges will sometimes misalign anteriorward with respect to the heads of the metacarpals, at the metacarpophalangeal joints. The correction is made as shown in figure 533. The thenar eminence is placed on the dorsal surface of the head of the involved metacarpal, and the involved phalange is grasped by the thumb and index finger, as shown. The thrust is given in a posteriorward direction with the flexed index finger.

The phalanges may misalign laterally, or in an anteriorward or posteriorward direction at the proximal or distal interphalangeal joints. The correction of a lateral displacement is being demonstrated

Figure 533: *Adjusting the metacarpophalangeal joints.*

Figure 534: *Adjusting a laterally displaced phalange.*

Figure 535: *Adjusting a posteriorly displaced phalange.*

in figure 534. The proximal phalange is being supported between the thumb and index finger of the doctor's right hand, while the middle phalange is being adjusted medialward by the doctor's left hand. In figure 535, the distal phalange of the patient's middle finger is being adjusted with the tip of the doctor's left thumb in an anteriorward direction, while the doctor's right hand stabilizes the hand.

Adjusting The Jaw

The jaw may misalign at either temporomandibular joint, producing pain, limited motion, vertigo, headaches, and hearing problems, as well as many other symptoms. The jaw can be checked by standing behind the patient, and placing the tips of the fingers over the temporomandibular joints, while the patient is asked to open and close his mouth slowly. A grating sensation will be felt over the involved TMJ. The condyle will misalign anteriorward and lateralward. This will usually cause lateral displacement of the jaw during movement, which can be observed from the front while the patient opens and closes the

mouth. The correction is made by placing the thenar on the ramus of the mandible, as shown in figure 536. The opposite ramus is supported by the doctor's stabilization hand, and the fingers cross over each other, as shown in figure 537. The patient is then asked to open the mouth as far as possible without undue pain. After this is accomplished, the patient is asked to close the mouth slowly. As the mouth is closed, posteriorward and medialward pressure is applied to the involved ramus, very gently, and not so forceful as to prevent closing of the mouth. At the same time, light inferiorward and posteriorward pressure is applied to the jaw by the doctor's fingers. This should be done repeatedly, until reduction is accomplished.

Figure 536: *Placement of the thenar on the ramus of the jaw.*

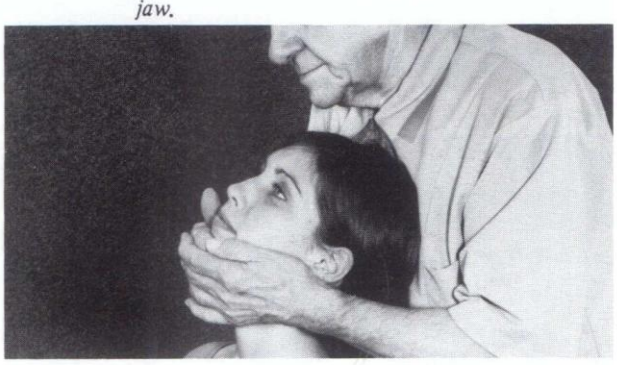
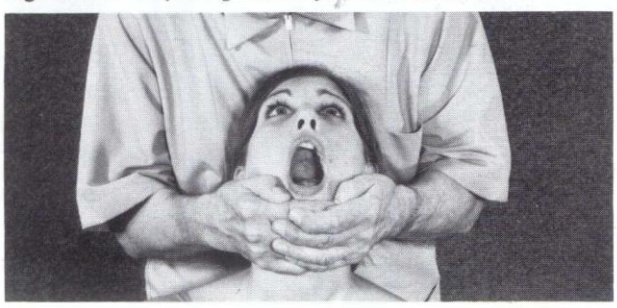


Figure 537: *Adjusting the temporomandibular joint.*



Adjusting The "Sinuses"

Each side of the frontal bone may be adjusted lateralward and posteriorward, to align it to the sphenoid, ethmoid, and other cranial and facial bones. This may correct sinus conditions, headaches, and other problems. The correction is made by placing the thenar over the frontal eminence, as shown in figure 538. The head is supported with the stabilization hand on the back of the skull, as illustrated in figure 539. The thrust is given in a posteriorward and lateralward direction. After one side is done in this way a number of times, the other side should be done also.

The maxilla is adjusted in order to correct conditions of the maxillary sinus, in a posteriorward, inferiorward, and lateralward direction. The doctor stands on the side opposite the maxilla being adjusted, and contacts the maxilla with his thumb, as shown in figure 540. The back of the patient's head is supported with the opposite hand, as shown in figure 541. The thrust is given inferiorward, posteriorward, and lateralward, with the tip of the thumb, while the fingers of the adjusting hand stabilize the jaw. After the maxilla on one side is adjusted, the other should also be done.

Figure 538: *Placement of the thenar over the frontal eminence.*

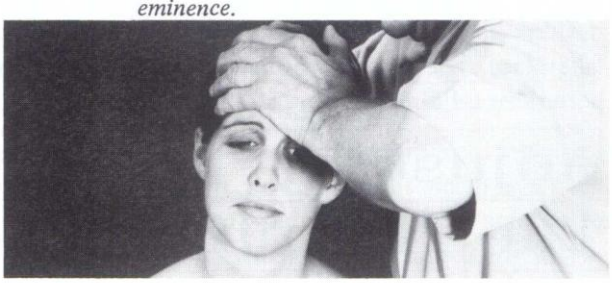


Figure 539: *Adjusting the frontal bone lateralward and posteriorward.*

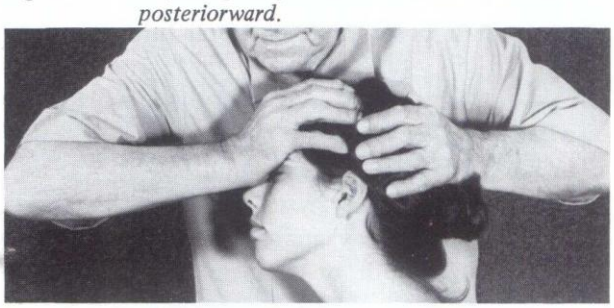


Figure 540: *Placing the thumb on the maxilla.*

Figure 541: *Adjusting the maxilla inferiorward, posteriorward, and lateralward.*